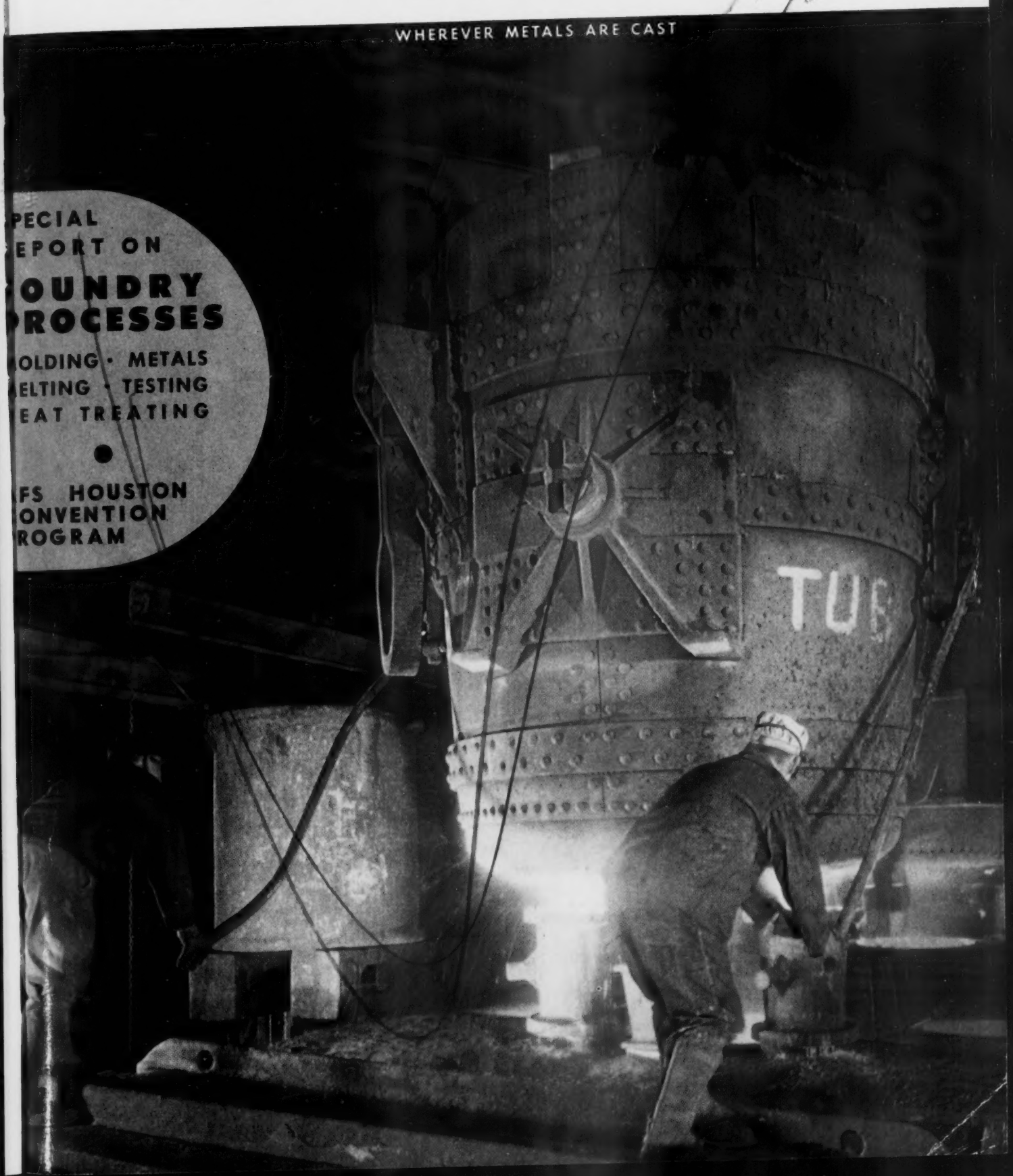
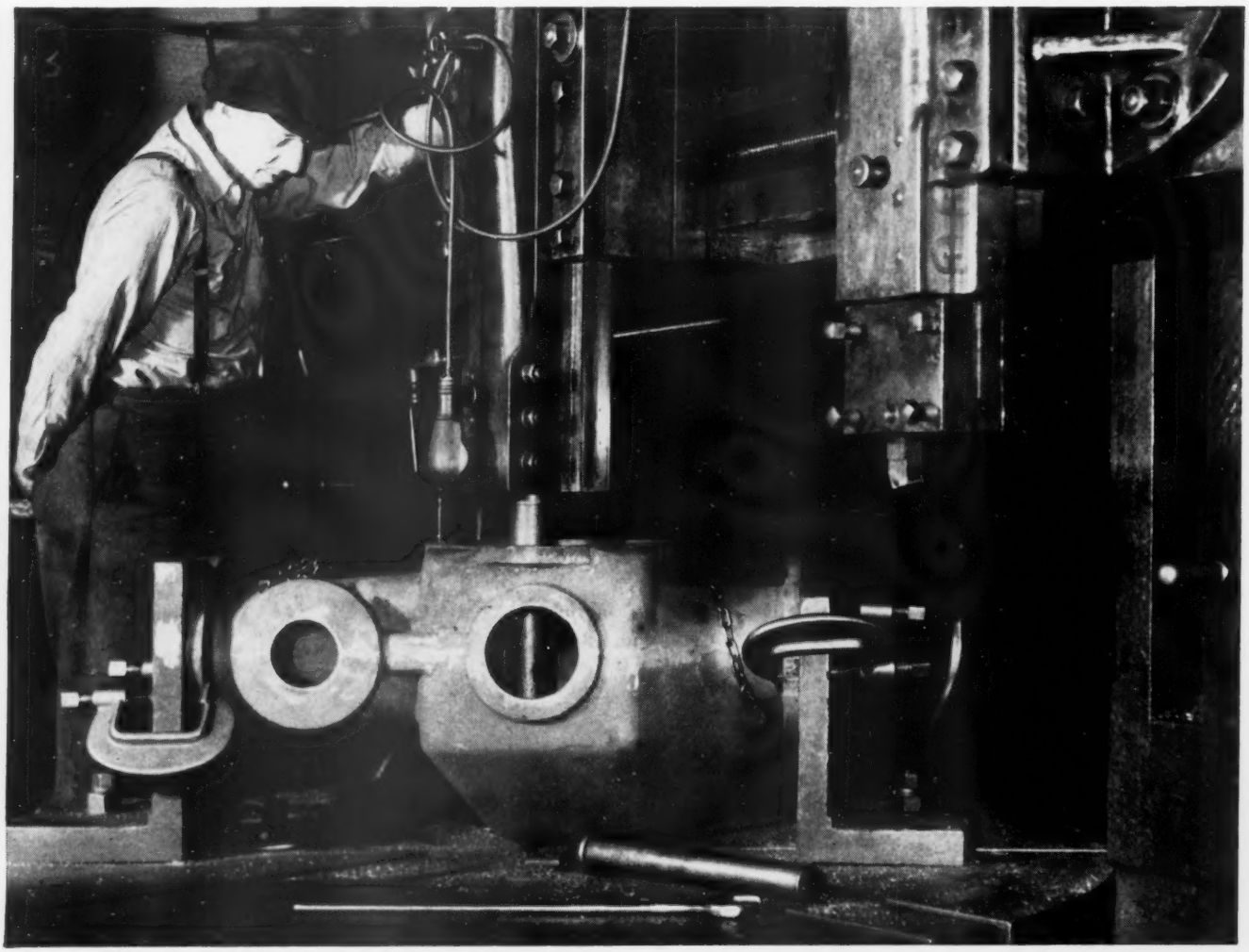
MAY 1955

FOUNDRY

WHEREVER METALS ARE CAST



Q. Why can some shops MACHINE MORE CASTINGS PER TOOL?



A. FERROCARBO® by CARBORUNDUM

REGISTERED TRADE MARK

YOUR CUSTOMERS WANT castings that are easy to machine. When *you* treat your gray iron with FERROCARBO® in patented briquette form, *they* can machine up to 35% more castings per tool, before resharpening. You can better guarantee them castings which are clean, sound, free of segregations and inclusions, with more resistance to wear and heat shock.

600 LEADING FOUNDRIES are now producing *premium* castings—both gray iron and malleable—by deoxidizing with FERROCARBO patented briquettes. Are you among them?

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Written for National Carbon Company's "Carbon and Graphite News" by Charles W. Vokac, Manager, Hydro-Arc Furnace Division of the Whiting Corporation, this article evaluates the electric furnace in light of current management problems. After a brief review of major applications, it covers such topics as:

- *"On-and-off" Economy*
- *Heat efficiency versus fuel cost*
- *Summary of electric furnace features as they affect distribution of fixed charges maintenance and overall plant efficiency*
- *Relation of temperature control to product quality*
- *Increased capacity and its relation to production expense*
- *More production per dollar of investment*
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There is no detailed discussion of any one phase of electric furnace operation. As a result, you get a broad, general picture of the important role the electric furnace plays in modern steel manufacture.

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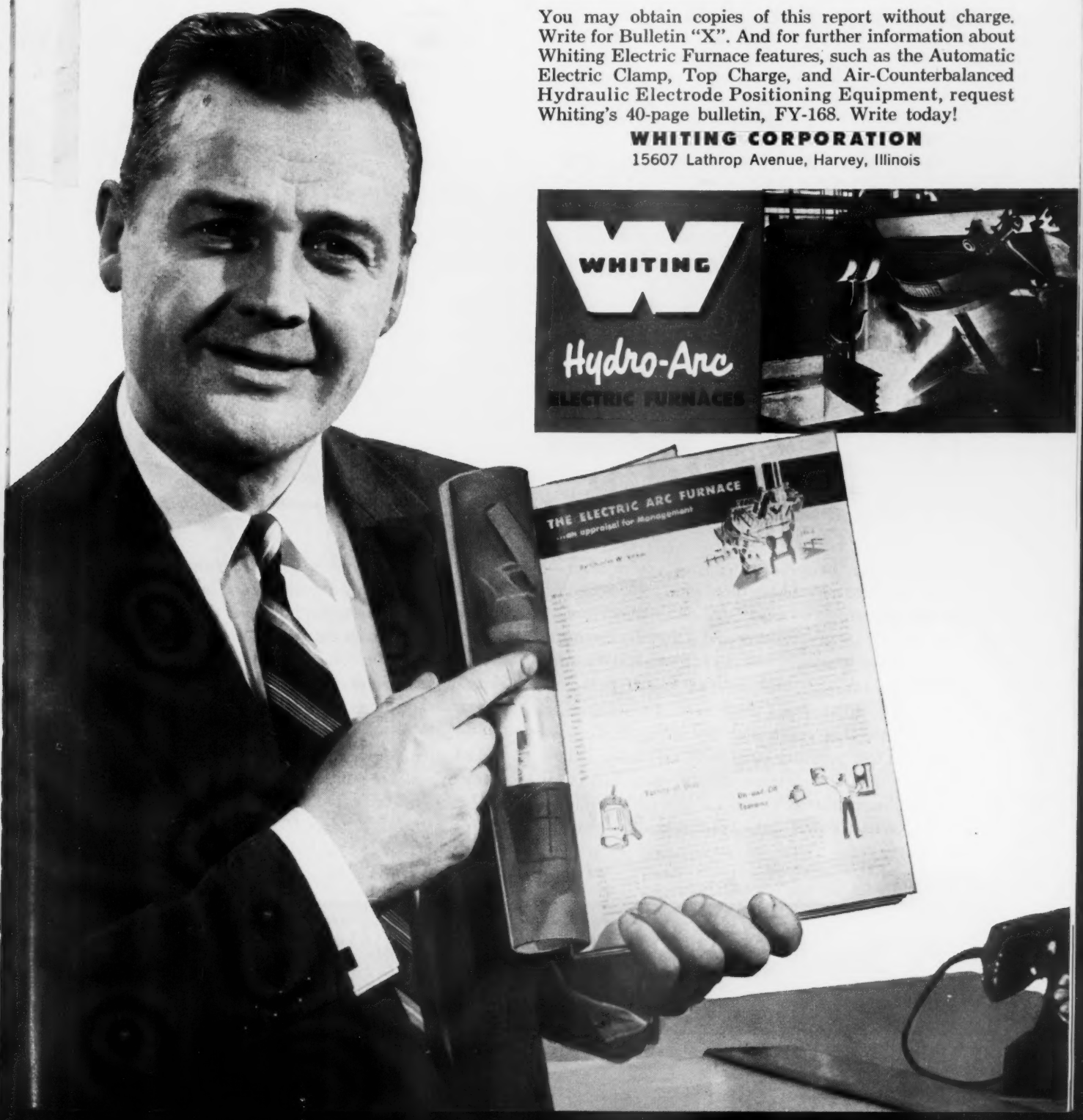

HERE'S ALL YOU NEED

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FOUNDRY

May 1955

Volume 83—Number 5

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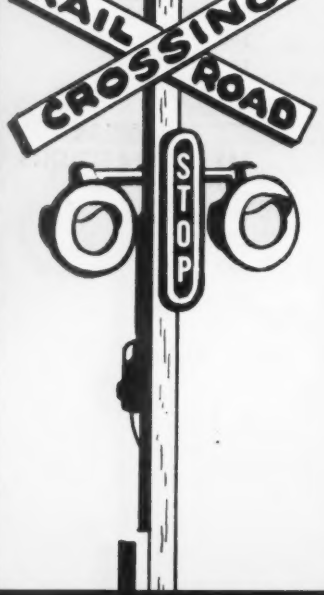
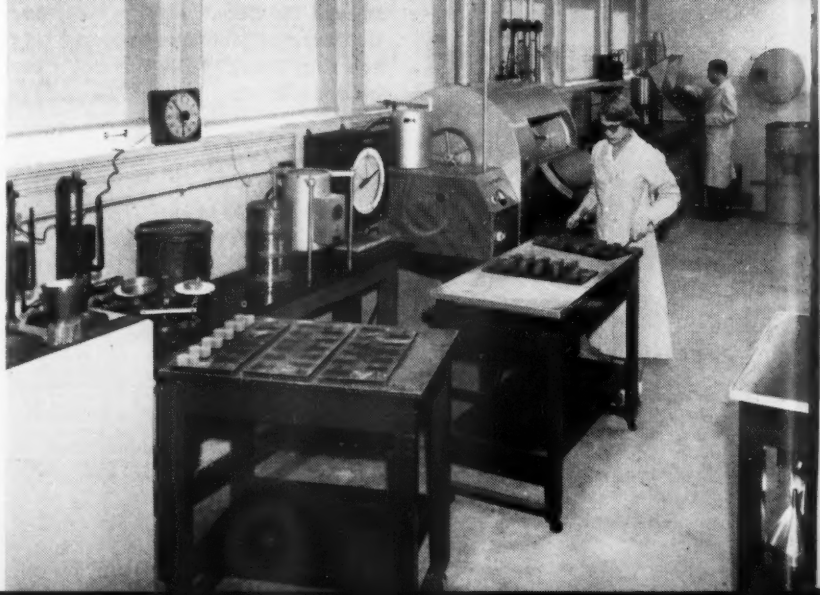
the fastest-moving line in the Foundry Field... on its way to you . . fr

Archer **LIN•O•CEL** is the most effective sand stabilizer available. It improves flowability, which in turn, produces better tolerance and definition. Because LIN-O-CEL compensates for sand expansion, it stops rat-tails, buckles, and scabs which normally might occur due to denser rams made possible by improved flowability.

LINOIL, the most-used core oil in America, produces stronger cores at less cost. You can find among the seven grades of "700 LINOILS", for instance, an oil practically tailor-made to your core requirements. Whatever the grade selected, you can depend upon uniformity from shipment to shipment.



Whether or not you are using ADM foundry products, it pays periodically to check your core mixture. Proper use of any material will save you production dollars. Your LINOIL man can assist you in analyzing your specific core problems. He is backed by fully-equipped laboratories, experienced ADM chemists, and foundry technicians who will analyze your problems upon request.



Improved foundry methods demand a constant flow of modified oils and binders, as well as entirely new products for core making and molding. The need today is for greater efficiency at lower cost.

ADM keeps pace with the foundry industry by anticipating its needs through never-ending research. Proof lies in the fact that more than half the core binders consumed in American foundries are made by ADM. Furthermore, foundrymen know they can rely on ADM for absolute uniformity . . . and service second to none.

...from ONE SOURCE!

INDUCTOL, the new pre-baked core oil, bakes in half the time required for conventional oils. It bakes over a wide temperature range and resists over-baking so that large and small cores can be successfully baked at the same time. INDUCTOL produces considerably less gas than most core oils.

FREFLO is used two ways: (1) As a core sand conditioning agent to reduce stickiness and improve workability. (¼ of 1% by weight should be added during the final 30 seconds of mixing.) (2) As a parting compound for metal molding patterns. FREFLO is a great aid in modern, high-speed equipment.

The most recent addition to the ADM line is **ADMIREZ** resin binders. Available in urea and phenol formaldehyde types in both liquid and powdered forms for cores. Phenol type also available in powdered form for "C" (or shell molding) process.

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Southeast Offers Opportunity to Makers of These Iron Products

Say Southeastern Purchasing Agents

Many iron products for which there is a large and growing market in the Southeast are either not now manufactured in the area or are produced in only limited supply. A recent report on "Manufacturing Opportunities in the Southeast"—Iron Products Section of District Seven, NAPA, Harlan E. Cross, chairman, cites:

GEARS, PINIONS, SPROCKETS, ETC. — No manufacturer in the Southeast makes gears and transmission machinery on a production line basis and produces these items for shelf stock.

AUTOMOTIVE AND FARM IMPLEMENT CASTINGS, including cylinder liners and cylinder sleeves of gray iron, piston rings, cast iron motor blocks, cast iron brake drums and linings, crank cases, clutch plates, cam shafts and exhaust manifolds are all manufactured in only limited quantities in the Southeast.

PUMPS, widely used in the mining industry, but made only by a few scattered manufacturers in the Southeast.

WHEELS, CAST IRON—RAILROAD AND MINE CARS for South's growing transportation industry and its mining industry.

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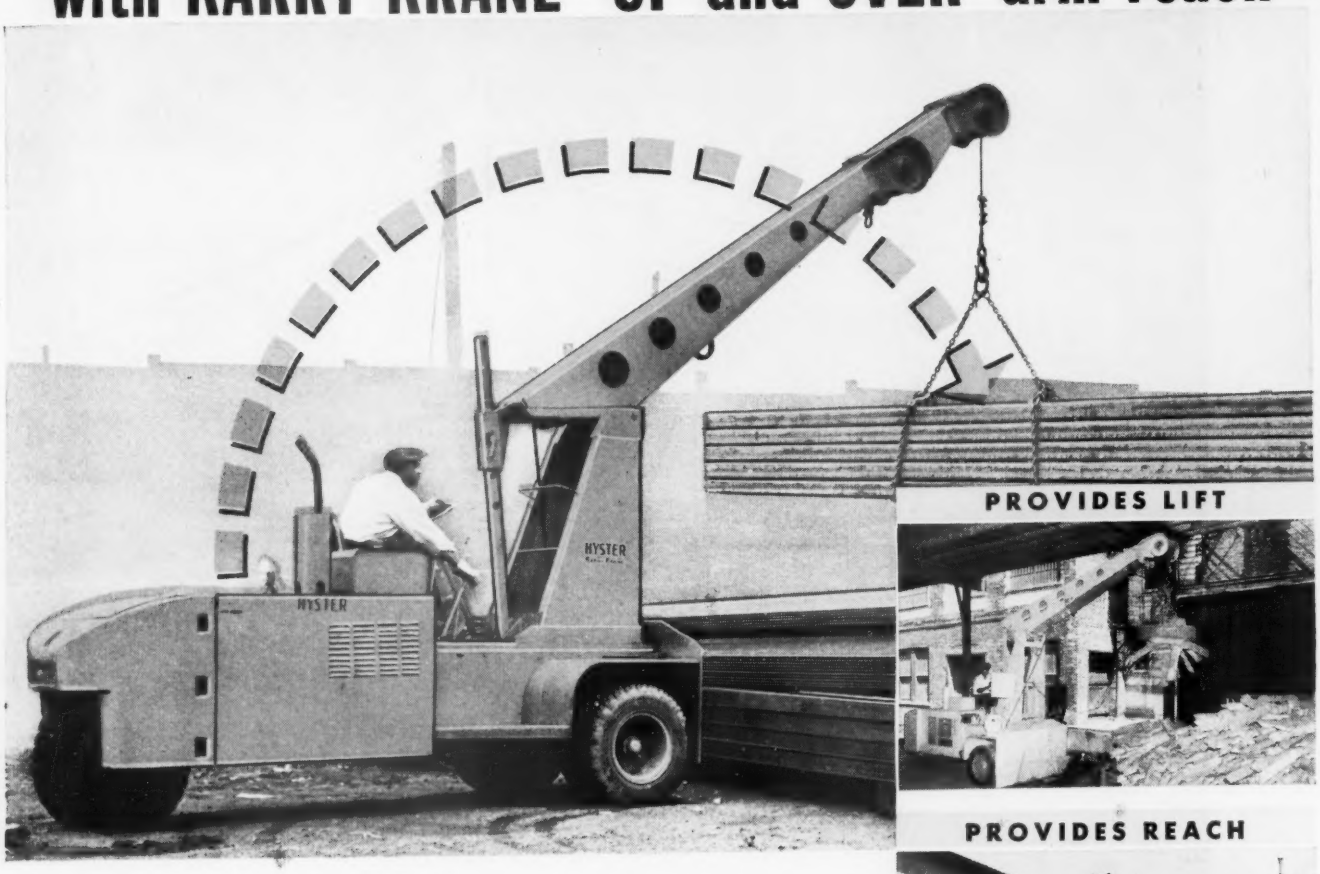
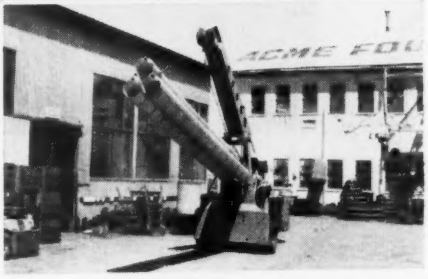


PROVIDES LIFT

PROVIDES REACH



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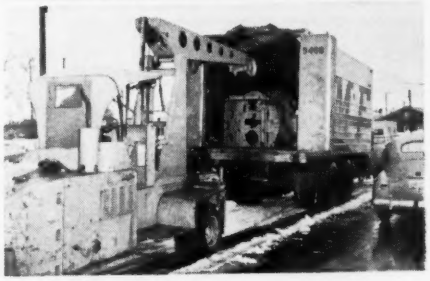

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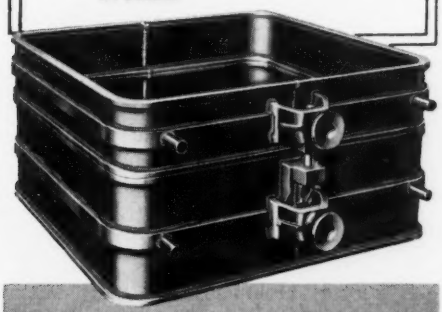
3. Cast steel pinlugs and clamplugs.
4. Elimination of corner stresses.



"PERFECTION" *Flasks—*

Designed By Foundrymen For Foundrymen!

...BS&B "PERFECTION" FOUNDRY FLASKS ARE *FIRST CHOICE!*

One of the nation's largest and most up-to-date foundries is that of the new Fairbanks-Morse pump manufacturing plant in Kansas City, Kansas. This single plant is equipped to manufacture *annually* enough pumps to move 35,000,000,000 gallons of fluid per day!

Naturally, a manufacturing operation like this requires a tremendous quantity of castings... up to 70 tons a day... and each casting must be of the highest quality!

When it came to selecting the foundry flasks that could stand up under this kind of service, and which would consistently turn out quality castings, year in and year out... BS&B "PERFECTION" flasks were *first choice!*

Like Fairbanks, Morse & Co., hundreds of foundries throughout the nation are getting better castings—and at lower cost—because they're using the flask that lasts... BS&B "PERFECTION"! Why not give them a trial in your foundry? Once you *try* them, you'll always *buy* them! Let your BS&B Representative give you the facts.

EFFICIENCY OVER 60 YEARS BS&B RELIABILITY

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IMPERIAL BELT lasts 4½ years lifting hot shakeout sand

Durability, economy proven at Allegheny Ludlum

The real test of satisfactory belting performance comes when the plant operator orders a replacement for an original belt. When this elevator was installed at the Aliegheny Ludlum Steel Corporation, Buffalo, N. Y., the conveyor company equipped it with an Imperial Standard Sahara (150′ x 12″ x 7 ply). For 4½ years that belt operated 16 hours a day elevating hot shakeout sand.

Its long life with minimum maintenance was an important cost factor in selecting a replacement — another Standard Sahara Belt.

Job-designed for long life

Imperial Sahara Belts are made of heavy-duty hard silver duck, double stitched to positively prevent ply separation. Special impregnation gives protection from the destructive action of sustained high temperatures. Manufactured in three types: Standard Sahara for temperatures to 300° F.; Insulated Sahara, up to 450°; Super Insulated Sahara, up to 600°. Let us make money-saving recommendations on your conveying or elevating jobs.

You expect more from Imperial . . . and you get more

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Engineered Belting— The Right Belt for Each Job

With the EDITORS

A SPECIAL REPORT: The "Special Report on Foundry Processes," which features 22 pages in the main editorial section (starting on page 106) has been made possible through the kind co-operation of 26 leaders in the foundry industry.

Thanks so much to each for a fine contribution to an interesting report.

—o—

Viewing with Alarm: One of the best reasons for the many predictions of early war by numerous newspaper columnists was given recently by Phil Porter, Sunday editor and columnist of the *Cleveland Plain Dealer,* as follows:

"One of our difficulties is that journalistically we can't get used to having nothing happen."

—o—

The Industry Grows: Speaking of publicity, the *Wall Street Journal* on Apr. 6 carried a story on "Iron Casters" which emphasized the number of foundries that have gone out of business in the last year and attributed this change to the recent move toward integration of castings by automobile companies and a few others.

This trend is not new. It started back in the early twenties when several automobile companies built big foundries and took their casting business away from jobbing shops. The movement has continued since then.

One might get the mistaken idea that the growth of the captive shop in a few fields means elimination of the jobbing shop. I do not believe that this is true. Numerous smaller manufacturing companies operating foundries have found it more economical to close their shops and buy castings from commercial foundries. Furthermore, the need for large tonnages of miscellaneous castings will continue, and much of this will come from jobbing shops.

While there have been a sizable number of plants closed during the past year, I believe there has been increase in capacity through mechanization, modernization and new plants, all increasing capacity.

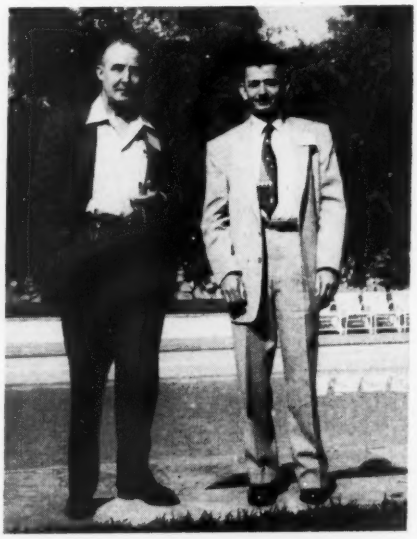
Many foundrymen may resent such statements in the article as "the independent iron foundry, an ancient institution that has taken a licking in recent years," or "gray iron foundries which had their start with the coming of the iron age, have the usually messy and smoky job of melting down iron - - -."

Any Blue Chips?: We have had several interesting calls from readers regarding the article "Any Blue Chips in the Foundry Industry?" which appeared in the April issue on pages 106-107. Comments indicated the belief that this article should be read carefully by every foundry manager, every salesman of castings, and by some of the larger companies.

Just in case some companies would like to pass the article along to their salesmen, the editors have prepared reprints, and these are available in small quantities to readers. Write me if you are interested.

—o—

At Pasadena: FOUNDRY's West coast columnists—Charlie Ammen ("Trouble Shooting") and Harold Henderson ("Meditations of a Sandman")—took an active part in the recent California Regional Foundry



Conference at Pasadena, Calif. Managing Editor Bill Gude, who attended the conference and whose report on it is presented in this issue, took this shot of the two boys during a lull in the activities. Harold, left, sand technician, H. C. Macaulay Foundry Co., Berkeley, Calif., addressed one of the gray iron sessions. Charlie, who recently organized the Ammen Nonferrous Corp. in Los Angeles, was chairman of one of the bronze sessions.

—o—

Signs of the Times: The Advertising Committee of the Gray Iron Founders' Society has asked the members of that organization, "Does Your Foundry Sign Do a Selling Job?"

From personal observation result-

When safety equipment is needed, it's needed IMMEDIATELY – if not sooner! No time to "shop around," no room for shipping delays. Nobody knows this better than a foundryman.

That's why so many foundrymen keep Pulmosan catalogs in a handy desk-drawer. They know that Pulmosan has *every* item of foundry safety equipment in stock, ready to ship within 24 hours. They know there's no "shopping" with Pulmosan—you always get dependable, tested equipment, the best for its particular purpose, competitively priced. And you can always count on Pulmosan, with its years of experience in foundry safety, for quick, reliable advice on safety problems.

Pulmosan makes you ready yesterday for tomorrow's hazards!

ASBESTOS GLOVES and MITTENS

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SANDBLAST HOODS

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BATTERY OF EIGHT STYLE 1303 HAUSFELD "LADLE-OUT" FURNACES

for die casting, shell molding and permanent molding

• The *Hausfeld* stationary or "ladle-out" furnaces are designed for die casting, permanent molding and shell molding. However, this style has been giving excellent results in sand foundries of all sizes, requiring a unit that would not only melt the metal, but hold it at a given temperature to meet production requirements. These furnaces accommodate the latest bowl-type crucibles and with the new Hausfeld Cover-Venting top construction give easier access to the entire bath of metal for dipping out. Capacities: 200 to 1000 pounds.

• Check your present melting costs. If they are high, they may be losing business for you. Let us make recommendations for Hausfeld Furnaces to meet your requirements, and cut your costs. Write for Bulletin 103 on crucible aluminum furnaces, or literature on any non-ferrous melting job. THE CAMPBELL-HAUSFELD CO., 300-320 Moore Street, Harrison, Ohio.

Hausfeld

METAL MELTING FURNACES

ing from traveling the railroads and highways, I can report that very few foundries have a sign of any description. And in most cases where signs do indicate the name of the organization, they certainly do not do a good selling job.

Therefore, the model layout for a plant identification sign, developed

by the committee with the aid of professional advice, provides much of interest. The accompanying illustration is from a 4-page pamphlet which is available from the society, National City-East 6th Bldg., Cleveland 14.

As the committee points out, such signs, erected all over the country and bearing a definite "family resemblance," will do much to awaken America to a realization of the widespread character of the industry.

I hope that the work of this committee will be the first step in better signs on foundries throughout the country.

—o—

AFS Slogan No. 59: Once again it is time for the annual convention of the AFS. This fact comes with quite a shock, for it hardly seems possible that a year has passed since the Cleveland convention and show. But here it is.

The boys down Texas way are quite pressing in their invitation to come and see their fine state and one of their principal cities. Many special features are planned, and Texas Chapter Night will be staged on Thursday to give convention visitors the flavor of a real Texas party.

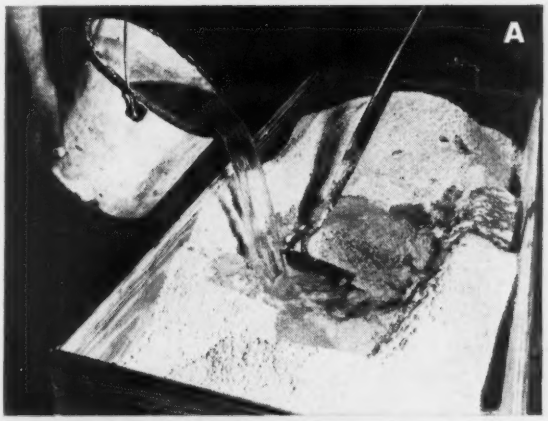
Hans Heine and the technical staff have prepared a fine program that will consider many phases of foundry practice. Roundtable discussions, shop courses and committee meetings should add to the interest of the meeting.

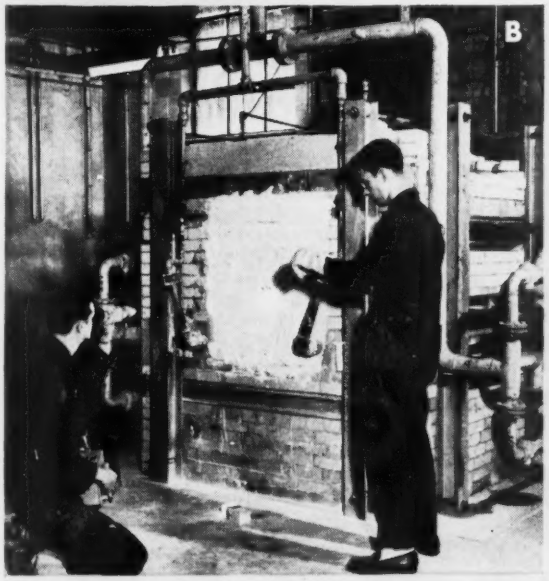
To gather material for reports on the convention for publication in the July post-convention issue, FOUNDRY will have a number of editors on hand in Houston. Bill Gude, Bob Herrmann, Ed Bremer, Ken Mountain and I will go down from Cleveland, and Erle Ross is driving down from Chicago.

We will be seeing you in Houston.

F.G.S.

NEW B&W 3200 degree Refractory Concrete





Today, in some types of heating and melting furnaces, complete linings or sections of linings are subjected to temperatures over 3000 F and, with the trend to higher and higher operating temperatures, the problem of finding the most economical refractories for this "over 3000 F service" will become even more important.

Now, with B&W's new Refractory Castable-3200, furnace builders and operators can cut installation costs by using castable construction for services up to 3200 F. As easy to use as other B&W refractory concretes, B&W Refractory Castable-3200 can be poured or trowelled into place or applied with a cement gun.

Several years ago, B&W developed Kaocast, the first successful 3000 degree refractory concrete, to lead this high temperature castable trend. B&W Castable-3200, like Kaocast, is made with an alumina-silica base and is recommended for temperatures from 2600 to 3200 F. Because of its very high temperature properties, it is not recommended for temperatures below 2600 F.

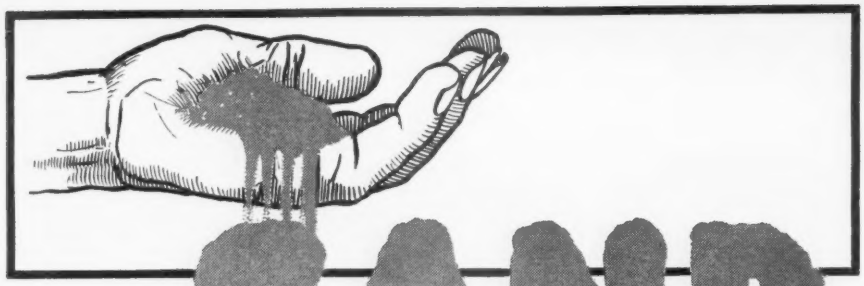
If you have not taken advantage of the fast, low cost installation of castables for your high temperature requirements, we suggest you investigate B&W Kaocast and the new B&W Castable-3200. Your local B&W Refractories Engineer has all the facts.

A Mixed like structural concrete, B&W Refractory Castable-3200 can be poured, trowelled or gunned into place. • **B** High temperature laboratory furnace lined with B&W Refractory Castable-3200.

B&W REFRACTORIES PRODUCTS: B&W Allmul Firebrick • B&W 80 Firebrick
B&W Junior Firebrick • B&W Insulating Firebrick • B&W Refractory Castables, Plastics and Mortars
OTHER B&W PRODUCTS: Stationary & Marine Boilers and Component Equipment
Chemical Recovery Units • Seamless & Welded Tubes • Pulverizers • Fuel Burning Equipment
Pressure Vessels • Alloy Castings

BABCOCK & WILCOX
THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 161 EAST 42ND ST. NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

R-530



SAND

PRODUCERS OF:

MANKO DRIED & SCREENED SILICA SAND:
Grain Fineness 50-75

MANKO SILICA FLOUR:
Foundry Grade—140 Mesh

MB DRIED & SCREENED LAKE SAND:
Grain Fineness 48-52

MICHIGAN CITY DRIED & SCREENED LAKE SAND:
Grain Fineness 53-55

MICHIANA DRIED & SCREENED LAKE SAND:
Grain Fineness Approx. 70

HIGH DENSITY BLENDED DRIED & SCREENED LAKE SANDS:
Grain Fineness 55-65

LIME FREE SAWYER SCREENED LAKE SAND:
Pit Moisture—Open or Closed Cars

MICHIGAN CITY SCREENED LAKE SAND:
Pit Moisture—Open or Closed Cars

DUNE PARK SCREENED LAKE SAND:
Pit Moisture—Open or Closed Cars

GARY SCREENED LAKE SAND:
Pit Moisture—Open or Closed Cars

MICHIANA SCREENED BANK SAND:
Grain Fineness Approx. 70—Open or Closed Cars

WABASH SCREENED BANK SAND:
Grain Fineness 80-100—Pit Moisture—Open or Closed Cars

DISTRIBUTORS OF:

RED CEDAR DRIED, MILLED & SCREENED MOLDING SAND:
Tennessee—Approx. Permeability Range 190-470

CYPRESS DRIED, MILLED & SCREENED MOLDING SAND:
Tennessee—Approx. Permeability Range 7-160

MAPLE DRIED, MILLED & SCREENED MOLDING SAND:
Indiana—Approx. Permeability Range 4-70

SWEDEN DRIED, MILLED & SCREENED MOLDING SAND:
Indiana—Approx. Permeability Range—80-100

VOLCLAY WESTERN BENTONITE

PANTHER CREEK SOUTHERN BENTONITE

KIOWA DRIED & SCREENED SILICA SAND:
Grain Fineness—35-90

KIOWA 100 DRIED & SCREENED SILICA SAND:
Shell Molding—D Process—Velvet Finish Cores

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TELEPHONES
ROCKTON 2-4221, 2-5581, 2-8511
OGDEN DUNES 2925, 3820

CALENDAR of Meetings

May 4-6—Investment Casting Institute, spring meeting, Park Sheraton Hotel, New York.

May 9-11—Metal Treating Institute, spring meeting, Ambassador Hotel, Los Angeles.

May 16-18—Industrial Heating Equipment Association, spring meeting, The Homestead, Hot Springs, Va.

May 16-20—Sixth National Materials Handling Exposition, International Amphitheater, Chicago.

May 19-21 — Non-Ferrous Founders' Society, annual meeting, Congress Hotel, Chicago.

May 22-26—Air Pollution Control Association, 48th annual meeting, Sheraton-Cadillac, Detroit.

May 23-25—American Management Association, general management conference, Roosevelt Hotel, New York.

May 23-25 — American Society for Quality Control, annual meeting, Hotel Statler, New York.

May 23-27—American Foundrymen's Society, 59th annual convention, Houston, Tex.

June 7-10—American Welding Society, national spring meeting and exposition, Municipal Auditorium, Kansas City, Mo.

June 16-18—Malleable Founders' Society, annual meeting, the Greenbrier, White Sulphur Springs, W. Va.

June 26-28—Alloy Casting Institute, annual meeting, The Homestead, Hot Springs, Va.

June 26-July 1—American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall Hotel, Atlantic City, N. J.

Sept. 6-17—National Machine Tool Builders Association, machine tool show, International Amphitheater, Chicago.

Sept. 6-17—Production Engineering Show, Navy Pier, Chicago.

Sept. 12-16—Instrument Society of America, instrument conference and exhibit, Shrine Exposition Hall and Auditorium, Los Angeles.

Sept. 29-30—Missouri Valley Regional Foundry Conference, sponsored by St. Louis, Tri-State, and Mo-Kan Chapters of AFS and Missouri School of Mines Student Chapter, at Missouri School of Mines and Metallurgy, Rolla, Mo.

Oct. 6-7—National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago.

Oct. 13-15—Foundry Equipment Manufacturers Association, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 14-16—Northwest Regional Foundry Conference, Portland, Oreg.

Oct. 16-18—Conveyor Equipment Manufacturers Association, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 17-18—American Coke & Coal Chemicals Institute, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 17-21—American Society for Metals, national metal exposition and congress, Convention Hall, Philadelphia.

Oct. 19-21—Gray Iron Founders' Society, annual meeting, Schroeder Hotel, Milwaukee.

Oct. 24-25—Steel Founders' Society of America, fall meeting, The Greenbrier, White Sulphur Springs, W. Va.

Nov. 1-3—Grinding Wheel Institute and Abrasive Grain Association, fall meeting, Statler Hotel, Buffalo.

Nov. 3-4—Metals Casting Conference, Purdue University, Lafayette, Ind.

Nov. 14-16—National Metal Trades Association, annual convention, Hotel Commodore, New York.

Nov. 16-18—Steel Founders' Society, annual technical and operation conference, Hotel Carter, Cleveland.

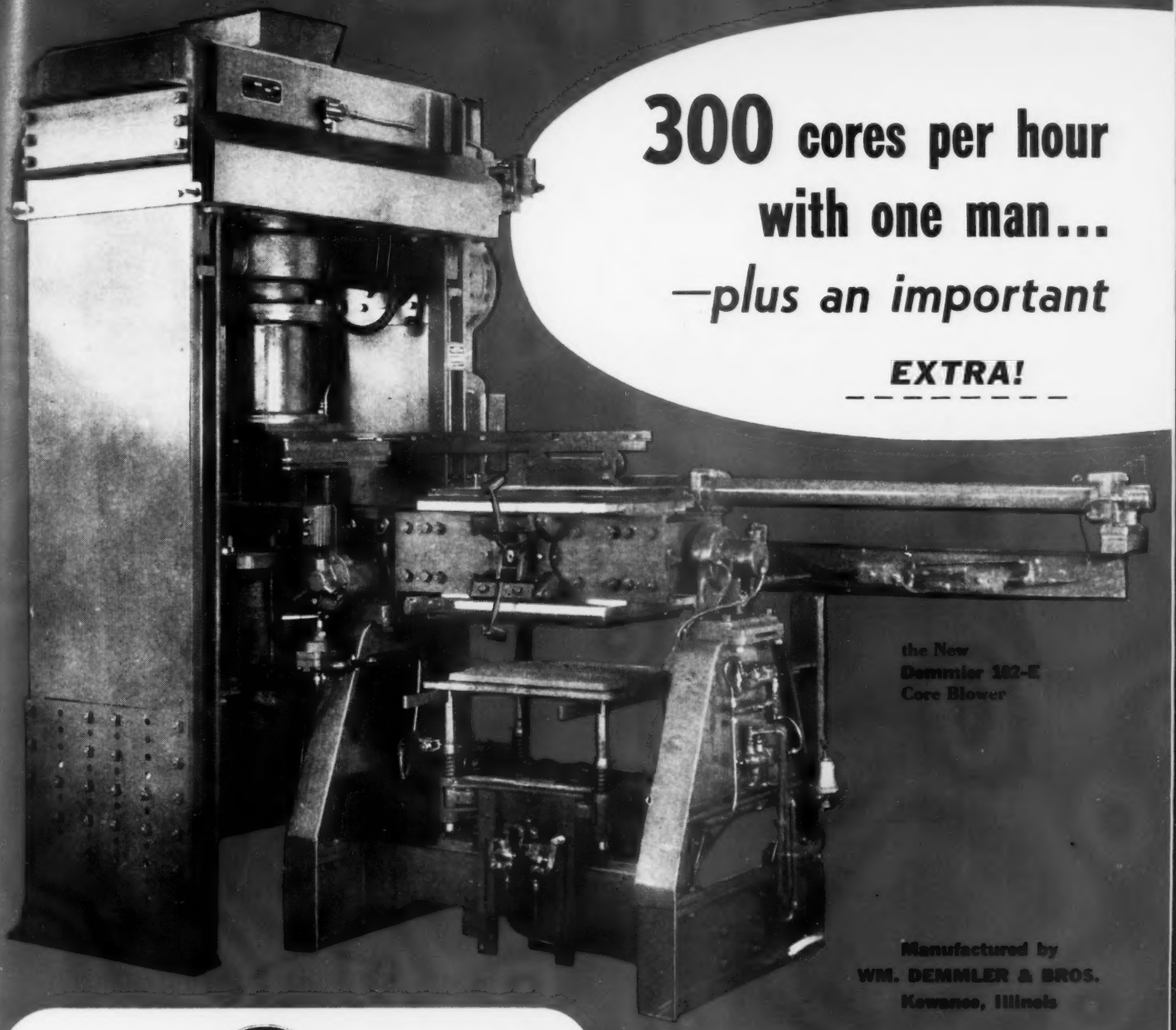
Dec. 1-2—Michigan Regional Foundry Conference, Michigan State College, East Lansing, Mich.

Dec. 7-9—American Institute of Mining & Metallurgical Engineers, electric furnace steel conference, Hotel William Penn, Pittsburgh.

300 cores per hour with one man...

—plus an important

EXTRA!



the New
Demmler 102-E
Core Blower

Manufactured by
WM. DEMMLER & BROS.
Kewanee, Illinois

NEW *HL* *150 Mesh Vents*

PRECISION CORE BOX VENTS

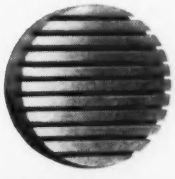
Demmler is also your best source for core box vents, built by specialists who know the importance of adhering to specifications. Many different diameters, slot widths, or screen meshes including the special 150 mesh stainless steel type for D-process shell molding. Write for literature on Demmler vents.

TYPE L — Lectromesh Vent

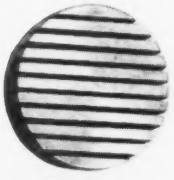
TYPE B — Perforated Vent

TYPE A — Perforated Vent

TYPE H — Screen Vent



TYPE C — Steel Slotted Vent

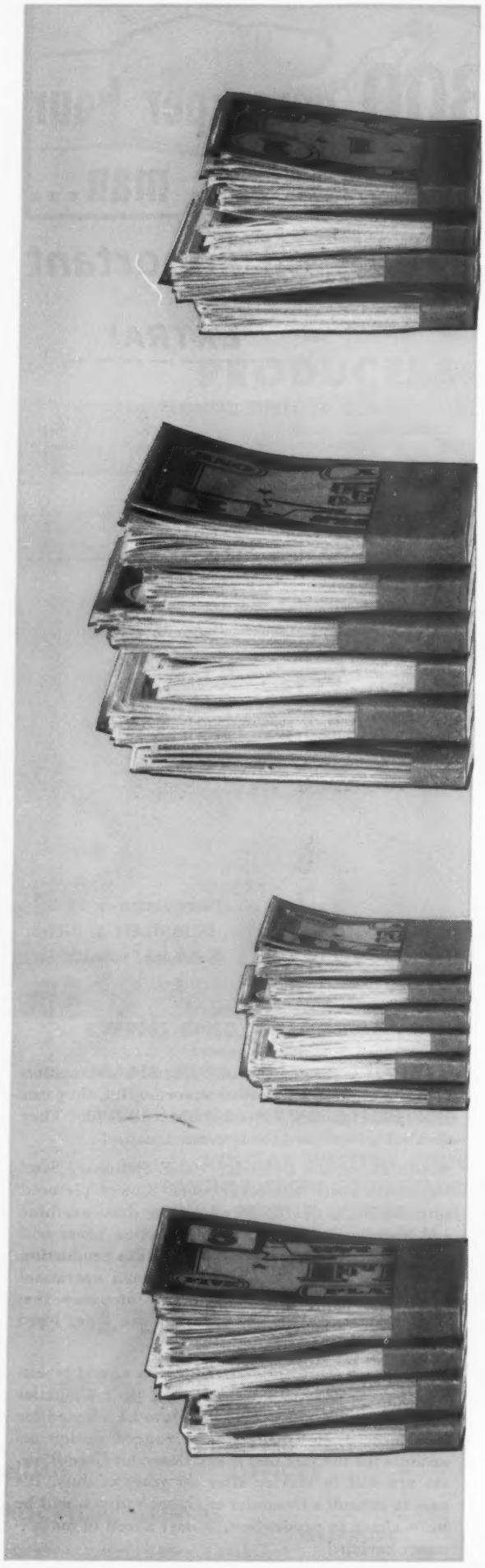


TYPE D — Brass Slotted Vent

Demmler Core Blowers lead the trend to automation with the highest production records. But, they can offer your foundry an important *extra*, too! They also hold the record for low maintenance!

Shown above, the Demmler 102-E Stationary Sand Magazine, Fully Automatic Core Blower pictured with the No. 6 double core-roll-over draw machine and core box shuttle. This production pacer will blow, draw, roll-over and draw cores at a production rate up to 300 per hour with one man operation! And, still offers Demmler-low maintenance that customers repeatedly say is lower than other types in actual tests.

That's why a Demmler Core Blower is a good investment. And, as operations change, your Demmler Core Blowers are flexible enough to be adapted for new jobs. This flexibility and rugged design acacounts for the fact that many Demmler Core Blowers are still in service after 40 years of duty. It's easy to consult a Demmler engineer and you will be units ahead in production, dollars ahead in maintenance savings!



Want to really cut costs in your cleaning room?

switch to

CINCINNATI PD Snagging Wheels

TAKE A TIP from the ever increasing number of foundries all across America, and switch to CINCINNATI (PD) SNAGGING WHEELS—the greatest grinding wheel development in years.

CINCINNATI (PD) WHEELS will absolutely cut costs in your cleaning room . . . saving you money four important ways:

- LONGER WHEEL LIFE—Through longer life of CINCINNATI (PD) WHEELS, users have reported almost *double* the production per wheel. One customer, using a portable grinder, gets almost *twice* the life with a CINCINNATI (PD) Flared Cup. Another user, snagging cylinder blocks on a swing frame, has increased the production per wheel 45% with (PD) WHEELS.

- FREER CUTTING—You can get more pounds of metal per hour with the grains and bonds specified by CINCINNATI for your jobs. Operators like the fast, easy cutting action of CINCINNATI (PD) WHEELS.

- SELF-DRESSING ACTION—The CINCINNATI (PD) WHEELS specified for your job by CINCINNATI abrasive engineers require few, if any, dressings. With the right grade of wheel, new cutting grits are bared as soon as old grits get dull and inefficient.

- POSITIVE DUPLICATION (PD)—"On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike, assuring you continued cost reduction.

CINCINNATI (PD) WHEELS are made in vitrified and resinoid bonds for both ferrous and non-ferrous foundries and are available in a complete variety of sizes and shapes.

Yet these better, cost-cutting CINCINNATI (PD) WHEELS *are priced no higher than ordinary wheels.*

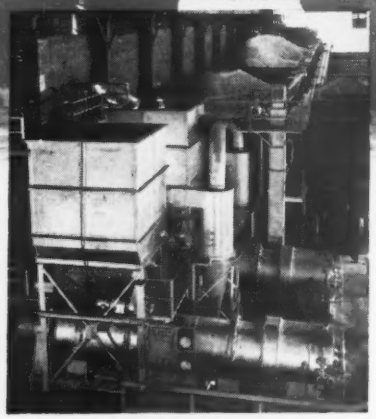
We'll be happy to prove to you how CINCINNATI (PD) WHEELS can increase your production and cut costs and time in your cleaning room. Just contact us and we'll send one of our representatives. Wire, write or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

CINCINNATI
Grinding Wheels

PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

DETROIT PUBLIC LIBRARY

Who hasn't heard of the mighty "CAT"?



Battery of two 48" diameter by 18 foot long rotary type sand driers and conveying equipment for handling sand from driers to storage bins.

No other machines have wrought more tremendous changes on the American industrial and agricultural scene—powerful machines that rearrange the earth's contours, help reap our harvests, build our roads, haul our timber. These and a thousand other tasks that man used to do in weeks, Caterpillar equipment now does in hours.

The men who build "Cats" use only the best in methods and materials. Their continued use of Ottawa Silica sand is good evidence of satisfaction; of product uniformity and purity.

OTTAWA
SILICA SANDS

For twenty five of Caterpillar's fifty years of existence the Great Lakes Foundry Sand Co., Detroit, has supplied Ottawa Silica Co.'s sand to the Caterpillar Foundry. It is a quarter century of service to be proud of.

Ottawa Silica Company extends congratulations to its jobber, and assurance that the quality which has kept Ottawa's product in good standing will be constantly maintained in the years to come.

OTTAWA
SILICA . COMPANY
PLANTS LOCATED IN
OTTAWA, ILL. AND ROCKWOOD, MICH.

SERVING THE FOUNDRY, GLASS, AND CERAMIC INDUSTRIES FOR OVER 50 YEARS

Control Foundry Chilling with...

CHILL KOOLHEAD NAILS

FIRST in demand
because they chill BEST.

FIRST in every performance test

FIRST in the horse car days . . . FIRST with the nation's great modern foundries . . . horse shoe nails have done an outstanding job . . . and remember this fact: NO SUBSTITUTE has ever been devised to take the place of "KOOLHEAD" horse nail types—price wise or otherwise.

Since 1872 our exclusive HOT FORGING process has produced fine nails at amazingly low prices. Research keeps "KOOLHEAD" far ahead in the field of internal chilling. Available in various metals, in a full range of shapes and sizes. Sold and priced per 100 lbs. to simplify your cost records. Outstanding service and rock-bottom prices add up to greater profits for you.

Write for detailed descriptions and prices.

Other Quality Products

STEEL Stanho PRODUCTS

PINS KEYS

SPECIAL PARTS

STANDARD HORSE NAIL CORP.

Since 1872

NEW BRIGHTON, PA.

F-4

Win $500 FIRST PRIZE

enter the 1955

GRAY IRON REDESIGN CONTEST

2ND PRIZE $250 **3RD PRIZE $100**

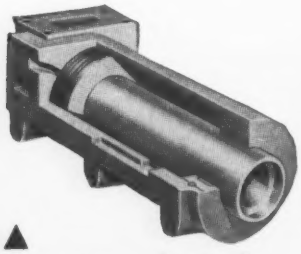
Make your redesign ideas pay off in cash! You are eligible if you have redesigned a product or part for production in gray iron which economically and efficiently replaced a competitive material. Regardless of how simple or complex your entry may be, you have a good chance of winning.

FOLLOW THESE EASY CONTEST RULES

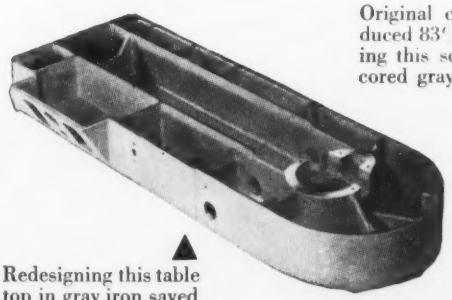
1. Select the best example of products or parts that you have redesigned for production in gray iron.
2. Give all facts leading up to your redesign . . . why you thought of gray iron . . . how much was saved in labor and/or material costs . . . how much efficiency was gained and any other factors leading to your decision.
3. Submit an 8″ x 10″ glossy photo of the gray iron casting with your entry. If possible, also submit a similar photo of the original design.
4. Your entry must be in the mail by July 1, 1955 the contest closing date. Address: Redesign Contest, Gray Iron Founders' Society, Inc., National City-E. 6th Bldg., Cleveland 14, Ohio.
5. Contest is open to all persons engaged in the metal-working trades . . . entries may be made jointly by two or more individuals. Awards will be made at the 27th annual meeting of the Society in Milwaukee, Oct. 21, 1955.

These examples of previous award winners show how easy it is to be a winner yourself . . .

Make it better with Gray Iron



▲ 22 parts were eliminated when the fabricated design of this hydraulic circuit was redesigned in gray iron.



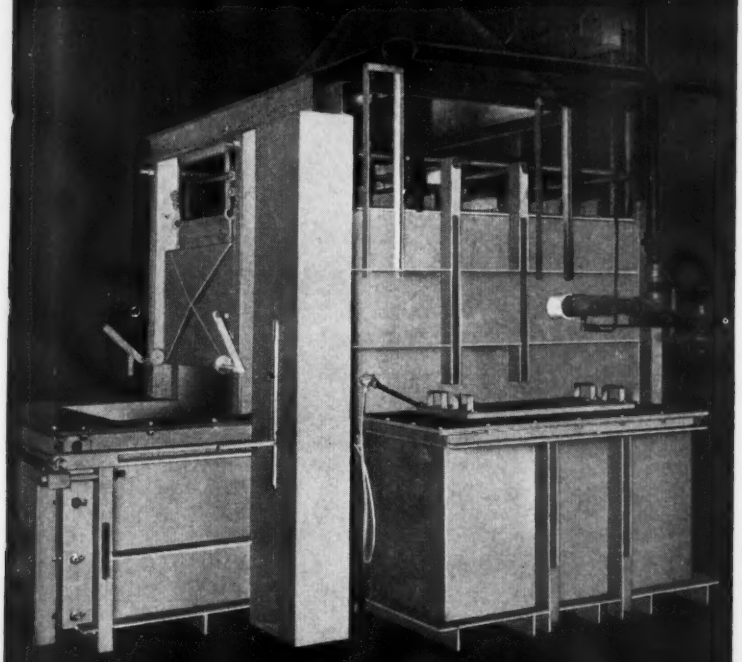
▲ Redesigning this table top in gray iron saved 15 hours in production time.

Original costs were reduced 83% by redesigning this screw nut as a cored gray iron casting. ▶

GRAY IRON FOUNDERS' SOCIETY

NEW NEW NEW!

Made for 120,000 lbs. Zinc



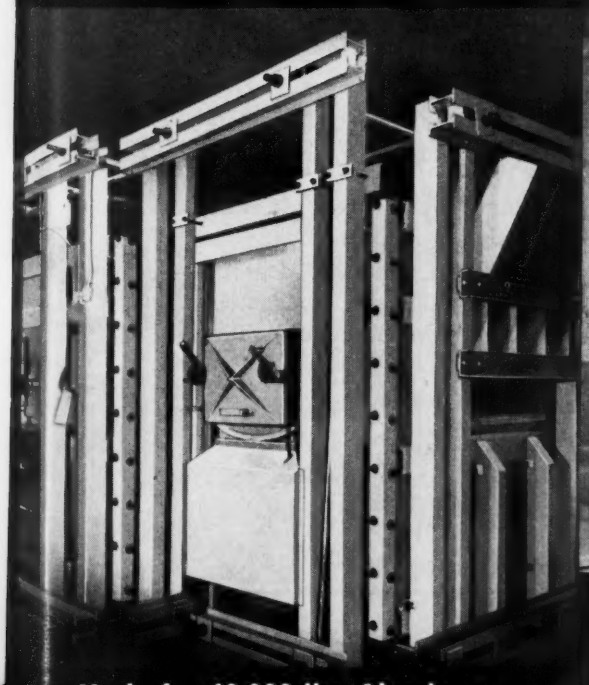
Made for 16,000 lbs. Zinc

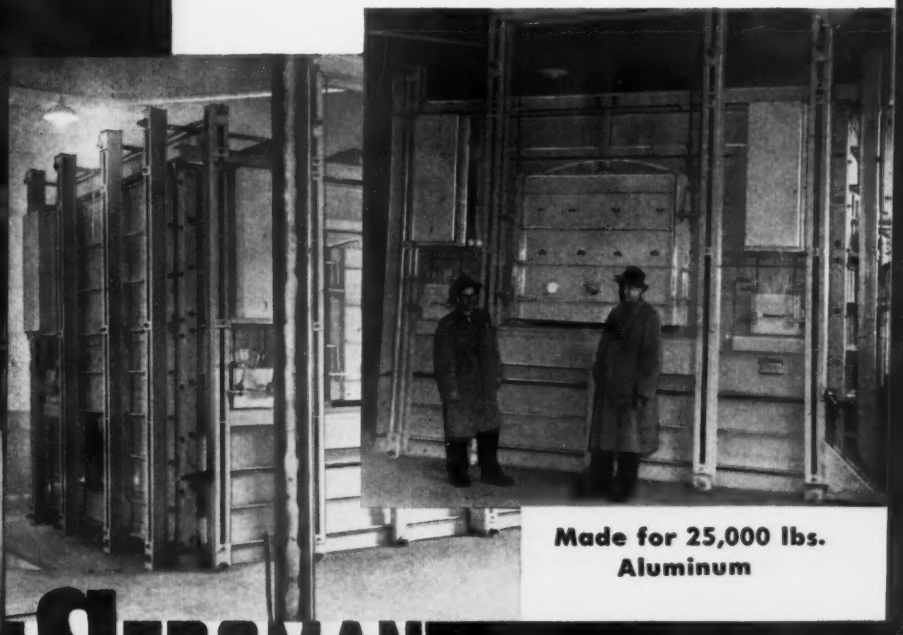
STROMAN NOW OFFERS A COMPLETE LINE OF REVERBERATORY FURNACES FOR THE MELTING OF . . .

ALUMINUM, ZINC, BRASS

Capacities are unlimited

These reverbs are built to assure heavy duty production for Smelting, Extrusion work, Die Casting, Permanent Molding and Foundry melting. Now in operation in some of the most prominent plants in the country they have proved their ability to deliver great volumes of metal that results in perfect castings, every time. They are easy to work with and around . . . operate most economically and are easy to maintain. Their efficiency and economy will amaze you and convince you of their superiority to any other furnace available. Why not write to-day for full information.





Made for 25,000 lbs. Aluminum

STROMAN FURNACE & ENGINEERING CO.
DIVISION OF
THE PETERSEN OVEN CO., FRANKLIN PARK, ILL.

...naturally it's

AMERICAN MONORAIL

This American MonoRail Monotractor unit, recently installed in a rug and carpet warehouse, dispatches hard to handle, big bulky loads over a wide area. Fully automatic, with finger-tip control, with a hoist capacity of 1,000 pounds, this installation is SAVING 200 MAN HOURS PER WEEK.

This is another of the many examples of American MonoRail engineering for low-cost, efficient overhead handling. Let your American MonoRail representative explain the versatility, low cost and low maintenance of American MonoRail equipment. Consultation in connection with any handling problem is available without obligation.

AMERICAN OVERHEAD HANDLING EQUIPMENT

MONORAIL COMPANY

13104 ATHENS AVENUE • CLEVELAND 7, OHIO

[IN CANADA—CANADIAN MONORAIL CO., LTD., GALT, ONT.]

Hundreds of hours longer . . .

NORBIDE® Pressure Blast Nozzles

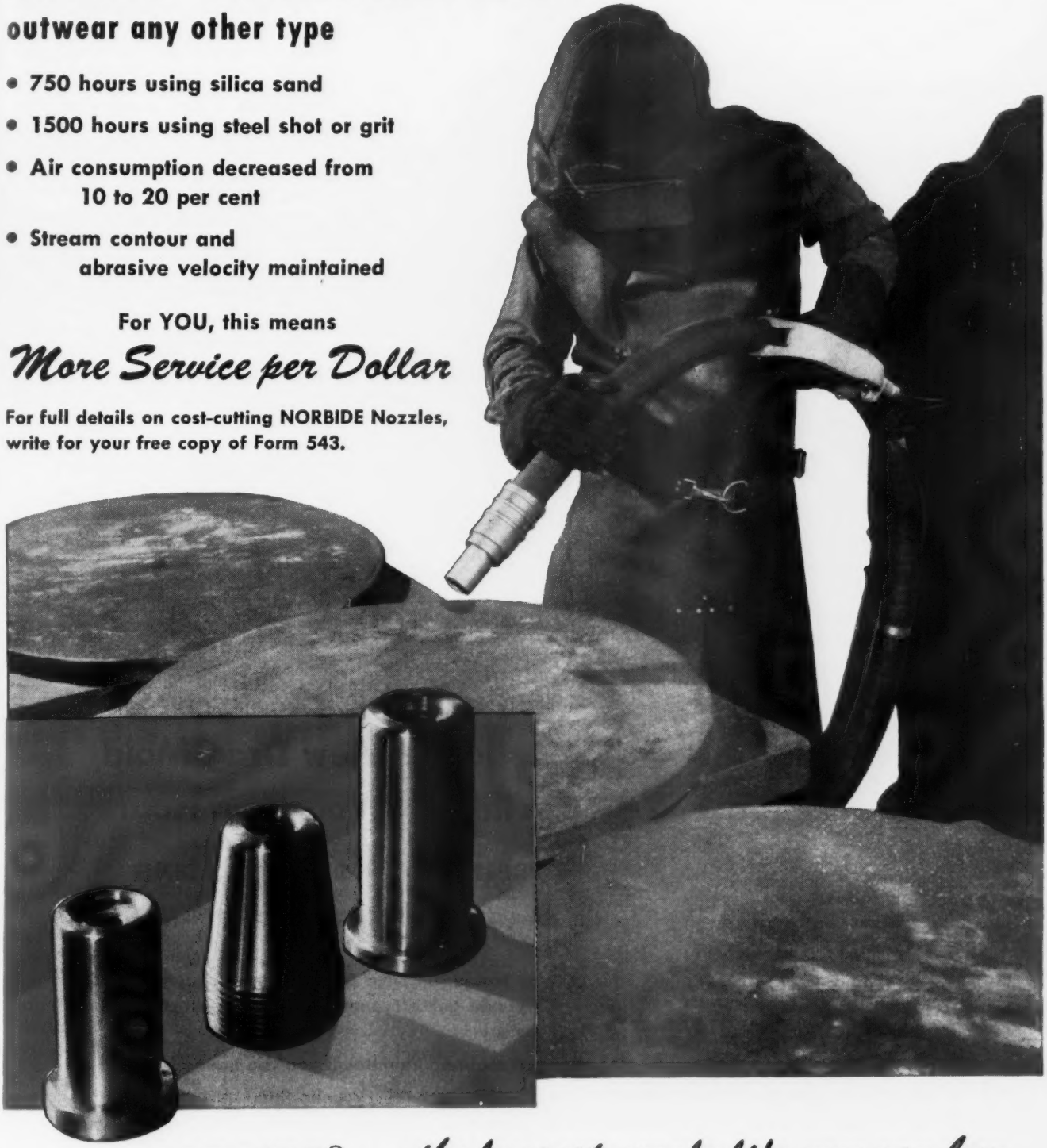
outwear any other type

- 750 hours using silica sand
- 1500 hours using steel shot or grit
- Air consumption decreased from 10 to 20 per cent
- Stream contour and abrasive velocity maintained

For YOU, this means

More Service per Dollar

For full details on cost-cutting NORBIDE Nozzles, write for your free copy of Form 543.



NORBIDE®... *the longest nozzle life you can buy*

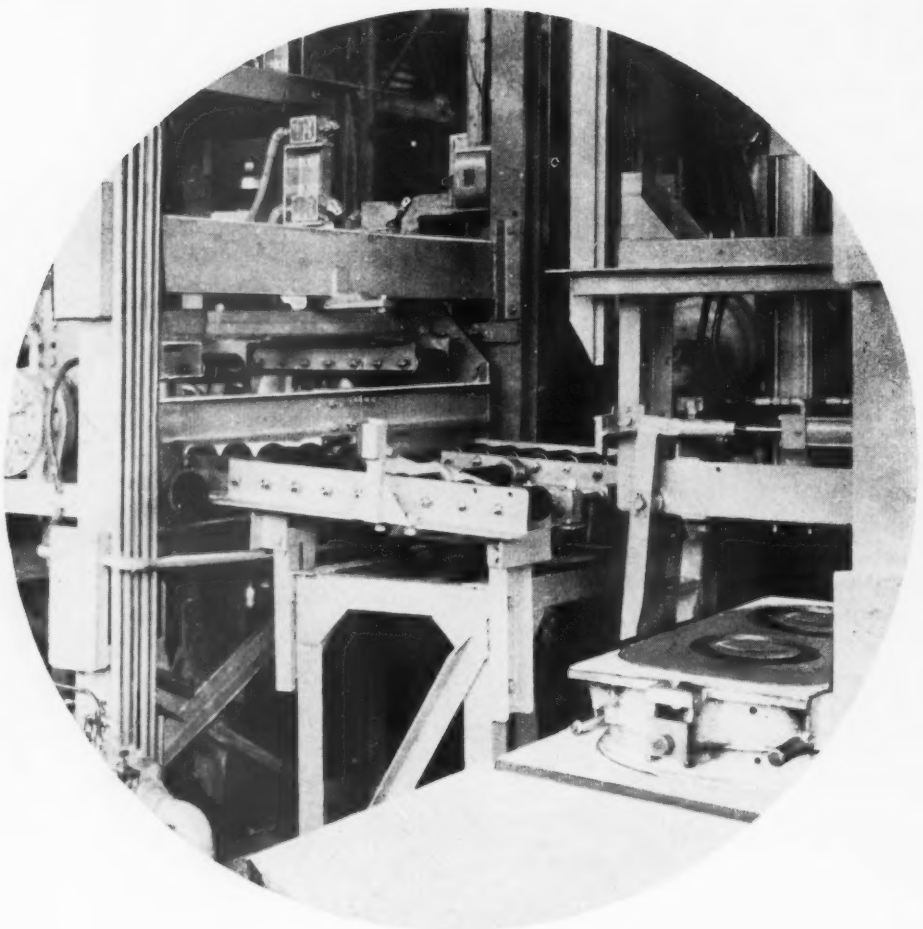
NORTON
BORON CARBIDE

NORTON COMPANY

43 New Bond Street • Worcester 6, Mass.

Making better products . . . to make other products better

PNEUMATIC . . . AUTOMATIC . . .



Whatever Your System, Nicholls New Drag Mold Turnover and Transfer Will Save You Man Hours

EASILY ADAPTABLE TO YOUR PRESENT METHOD OF MOLDING

Reduce production costs, cure molding bottlenecks, save precious manpower, increase output.

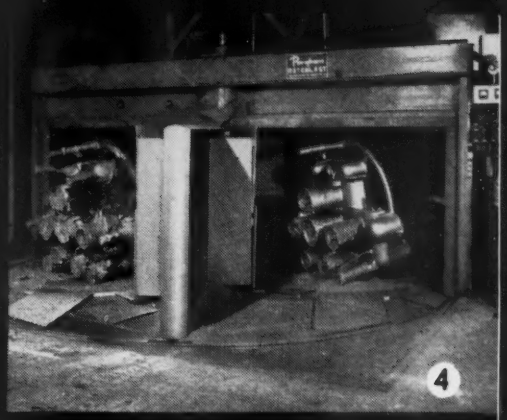
Ask the question . . . "How much manpower would we save per year in having all of our drag molds turned over pneumatically and set off automatically on either our roller or moving car conveyor?"

Then, remember, if it's Nicholls, it's the best molding equipment you can have.

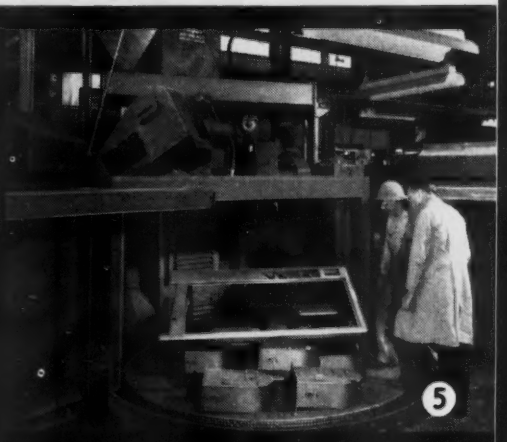
Write for descriptive literature giving specifications on the Nicholls line.

William H. Nicholls Co., Inc., Richmond Hill 18, Long Island, N. Y.

NICHOLLS



Whatever your blast cleaning job,



there's a Pangborn machine

Barrels (1&2), Tables (3&4), Table Rooms (5), Rooms (6), and Special Machines (7)—Pangborn maintains leadership in the blast cleaning field with a complete line of blast cleaning equipment! Whatever you clean, there's a Pangborn machine for you. Whatever machine you need, you can be sure of faster, better, cheaper cleaning. That's because Pangborn Rotoblast throws more abrasive over a larger area *quickly*—giving you a thorough cleaning job in less time at less cost! See for yourself how Pangborn Rotoblast can save you money! Write for Bulletin 227 to: PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

*U. S. Patent #2184926 (other patents pending)

to do it better!

Pangborn

BLAST CLEANS CHEAPER

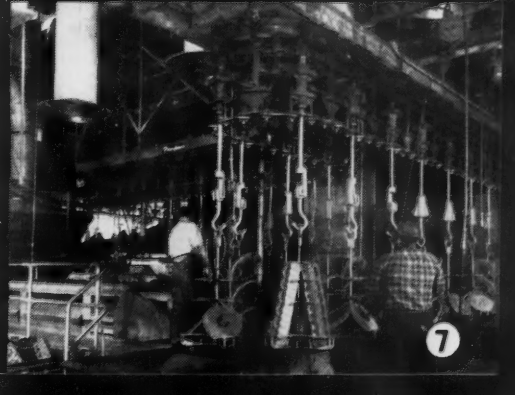
Rotoblast Blastmaster® & Continuous-Flo Barrel

Rotoblast Tables & Table-Rooms

Special Blast Rooms & Cabinets

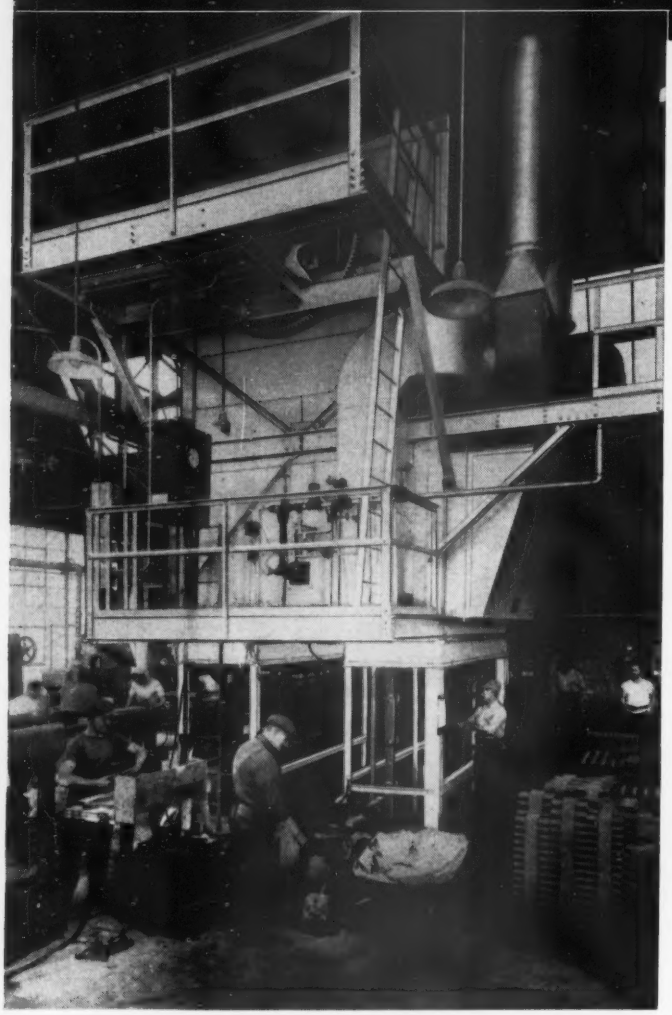
Pangborn Dust Control Equipment

Malleabrasive* Shot & Grit



better production costs less with

COLEMAN OVENS



Coleman Tower® Oven

FAST, EFFICIENT production of uniformly good cores and molds is a major factor in increasing foundry profits. Actual performance records in all classes of foundries show that Coleman Ovens are a profit making investment because they are reducing overall core department costs by as much as 50%.

Outdated ovens may be the most expensive equipment you own. They cannot compete against the modern design and exclusive advantages of Coleman Ovens which are reflected in substantial production economies. Investigate the savings you would realize from Coleman Ovens.

MORE THAN HALF A CENTURY of specialized foundry oven engineering experience is your assurance that the Coleman Oven recommended to you will do your work to your complete satisfaction. Our experienced oven Engineers will give you practical suggestions for your particular requirement.

THE FOUNDRY EQUIPMENT COMPANY

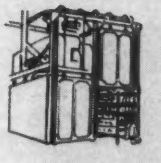
1821 Columbus Road • Cleveland 13, Ohio

World's Only Complete Line of Foundry Ovens

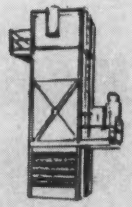
● WRITE FOR BULLETIN 54

COLEMAN PORTABLE CORE OVENS

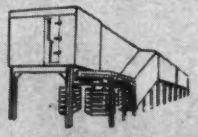
COLEMAN ROLLING DRAWER CORE OVENS



COLEMAN TRANSRACK CORE OVENS



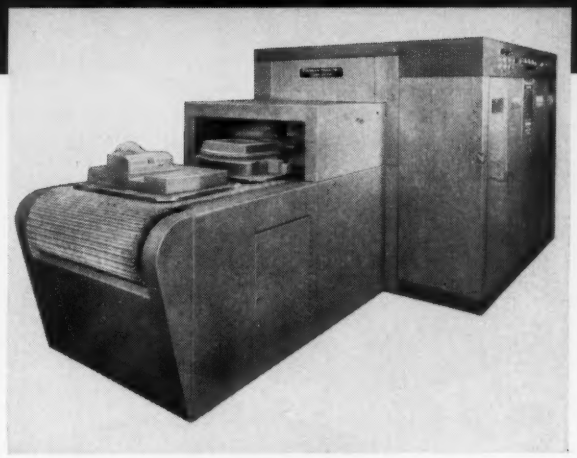
COLEMAN TOWER CORE OVENS



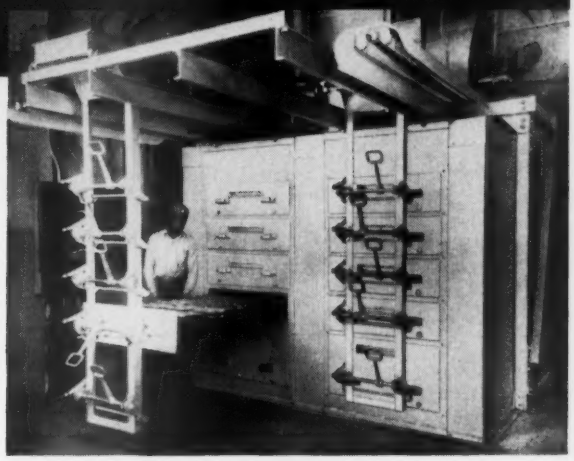
COLEMAN HORIZONTAL CONVEYOR CORE OVENS

Coleman Transrack Ovens

Coleman Car Type Mold Ovens



Coleman Dielectric Oven



Coleman Rolling Drawer Ovens

Only COLEMAN offers a complete line of foundry ovens with all these advantages

RECIRCULATING HEATING OR DIELECTRIC SYSTEMS to meet your requirement best.

DEPENDABLE BAKING AND DRYING. Coleman Ovens remove all uncertainties in core baking and mold drying. Rejects and make-overs are eliminated.

INCREASED LABOR SAVING. Efficient and modern mechanical designs reduce handling and other indirect labor to a minimum.

HEAVY DUTY CONSTRUCTION. Responsible for dependable performance, economical operation, and minimum maintenance cost under rugged service requirements.

MAXIMUM FUEL ECONOMY. Coleman Heating Systems use the most economical fuel available to you — gas, oil, stoker-coal, electricity, etc.

FLEXIBILITY AND ACCURATE CONTROL to bake oil or resin binders—whichever is most satisfactory for your requirements.

BETTER WORKING CONDITIONS. Positive ventilation built into Coleman Ovens prevents leakage of fumes and gases—helps to make the core department a good place to work.

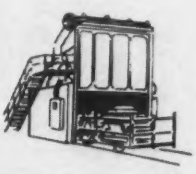
ADVANCED OVEN "KNOW-HOW". Coleman Engineers have pioneered and developed the most efficient oven designs to meet the highly specialized needs of modern foundry methods in all classes of work.

WIDEST EXPERIENCE. Gained through 50 years of specialization in foundry ovens and the building of more than 11,000 successful Coleman Oven installations.

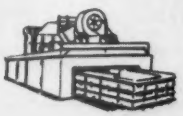
Let us recommend the RIGHT type of core or mold oven for your requirements — we make them ALL!

COLEMAN CONVEYOR REDRY OVENS

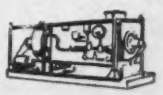
COLEMAN DIELECTRIC CORE OVENS



COLEMAN CAR-TYPE OVENS



COLEMAN HIGH-SPEED MOLD OVENS



COLEMAN PORTABLE MOLD DRYERS

Adams 10″—32″
Jolt Squeezer
Portable Type

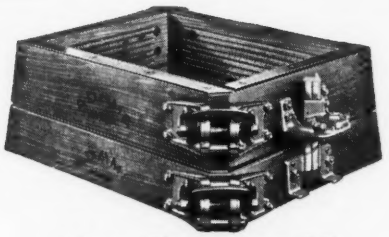
PARTNERS IN PRODUCTION

Adams moulding machines and custom-built flask equipment

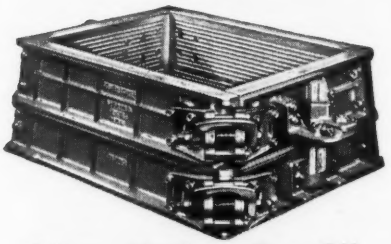
Here are the Partners that keep production rolling and costs low. The Partners that help you meet today's increasing competition with *faster* production of *better* castings at *lower cost.*

Adams Molding Machines—have the speed, power and durability for consistently large output day after day. You get accurate, uniform molds through close control of jolting and squeezing operation.

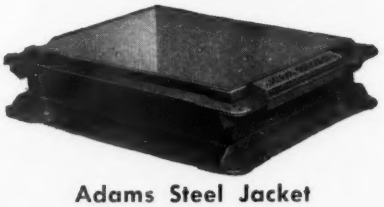
Adams Flasks—custom-built to your exact specifications. Get these Partners on your production team. Write today for full information.



Adams Cherry Easy-Off



Adams Aluminum Easy-Off



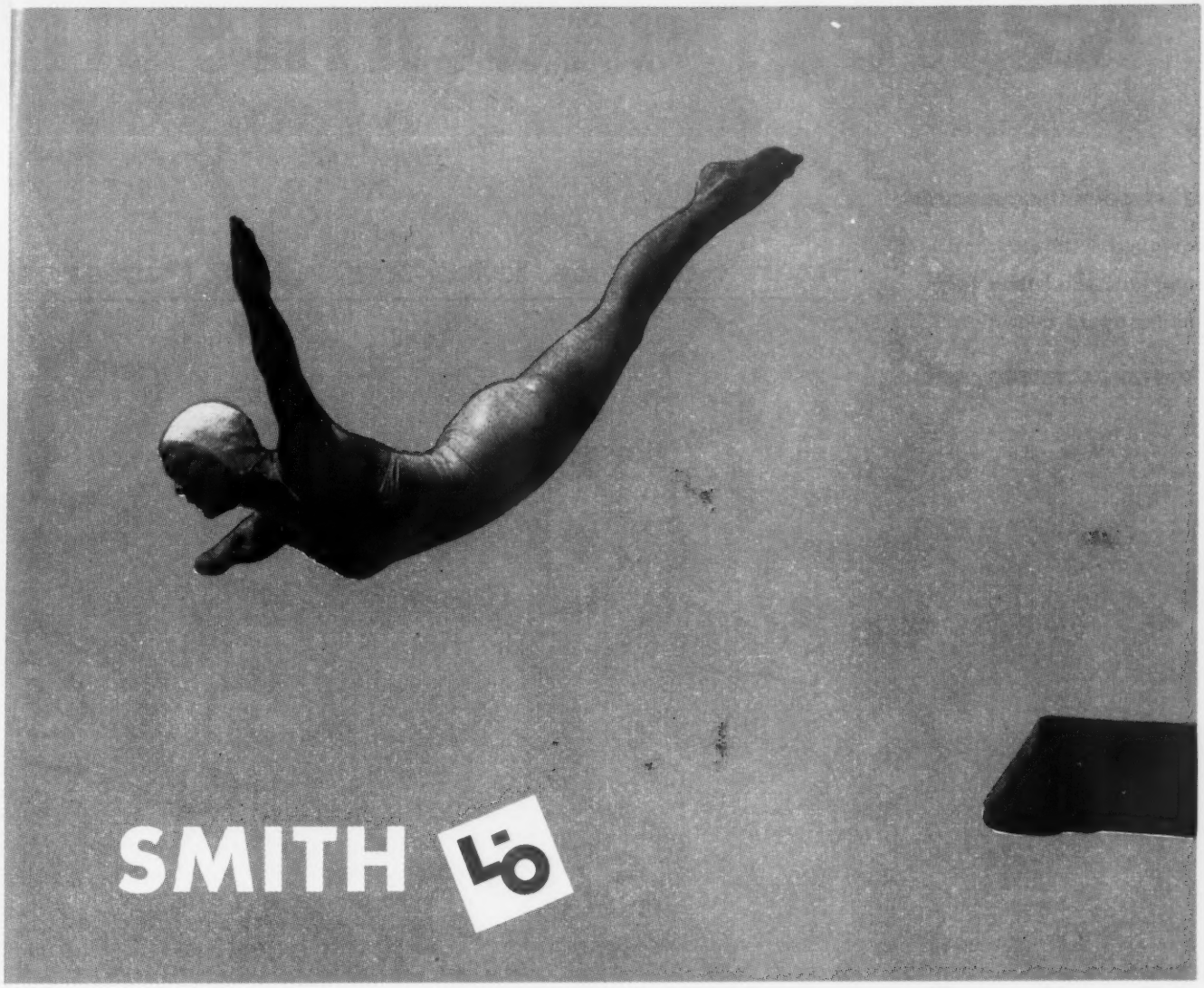
Adams Steel Jacket

The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

700 FOSTER STREET, DUBUQUE, IOWA, U.S.A.



Your springboard to *Better Cores*

Put Smith L-O Core Oil on the job and you'll notice an appreciable gain in savings of time and effort, as well as production of clean, accurate cores. Regardless of your foundry set-up — whether jobbing or production . . . using ferrous or non-ferrous metals — you can order a grade of Smith L-O ideally suited to your needs.

Order this quality binder from the representative nearest you, and know first-hand why others consider Smith L-O a superior core oil.

SMITH REPRESENTATIVES

- ALGONQUIN CHEMICAL CO., INC. Hamburg, Pennsylvania
- FOUNDRIES MATERIALS CO. Coldwater, Michigan
- FOUNDRY SERVICE CO. Birmingham, Alabama
- F. F. SHORTSLEEVE Elmira, New York
- PACIFIC GRAPHITE CO., INC. Los Angeles 22, California
- ST. LOUIS COKE & FOUNDRY SUPPLY CO. St. Louis, Missouri
- WESTERN FOUNDRY SAND CO. Seattle, Washington
- WESTERN INDUSTRIAL SUPPLY CO. Portland 14, Oregon
- MALCOLM G. STEVENS Arlington, Massachusetts

Smith L-O *Core Oil*

ROD DIP LIQUID PARTING

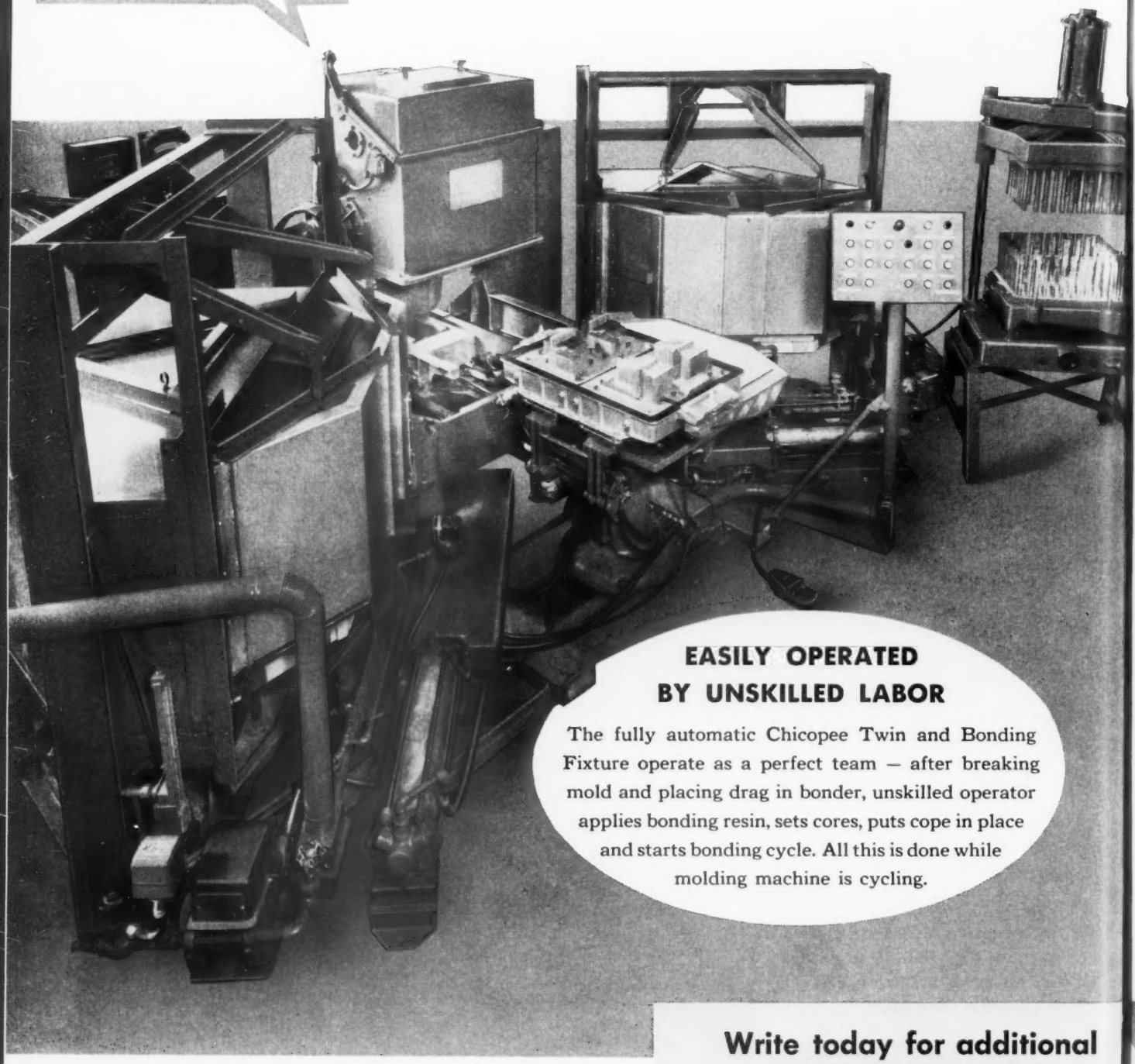
SMITH OIL & REFINING CO.

INDUSTRIAL OILS DIVISION • ROCKFORD, ILLINOIS

Newest Machine in

Equipped with standard automatic sand feed for uninterrupted operation.

Both Stations take 20" x 30" Patterns



EASILY OPERATED BY UNSKILLED LABOR

The fully automatic Chicopee Twin and Bonding Fixture operate as a perfect team — after breaking mold and placing drag in bonder, unskilled operator applies bonding resin, sets cores, puts cope in place and starts bonding cycle. All this is done while molding machine is cycling.

The Chicopee Twin delivers maximum Shell Mold Output per Operator

Write today for additional information on the *Chicopee Twin* and its companion the SHELL BONDER

Shell Molding

MADE BY THE MANUFACTURER OF THE MOST WIDELY USED AUTOMATIC SHELL MOLDING MACHINE

Produces More Finished Shell Molds per Operator than any other Machine

MORE PRODUCTION . . . A fully automatic shell molding machine that can produce shells for two different jobs at the same time . . . Patterns can be changed on either station without interrupting production on the other station . . . No time lost if you have pattern trouble, machine can be run with either station inoperative. The most productive shell molding machine obtainable for long or short runs.

PROVEN PRINCIPLE . . . The vertical drop of sand-resin mix still produces the densest molds. Tests and production runs prove that vertically dropped mix gets in all the intricate pockets . . . makes a perfect shell mold of any pattern contour. Another outstanding feature of the Chicopee Twin.

GREATER ECONOMY OF OPERATION . . . No strip heaters used in pattern plates, keeps pattern costs to minimum. Self Aligning — Machine designed to be self aligning at investment and ejection stations regardless of temperature variations. Ejection station is air operated hydraulic cylinder with an extremely long bearing to provide a positive square ejection stroke — no cracked or broken shells.

Horizontal or Vertical pouring—no back-up—dense shells stop metal penetration — no voids or spongy areas. Produces castings with uniform surface. Saves 50% or more of machining operations.

Standard pattern accessories available for use with the Chicopee Twin include — Locating Buttons, Ejection Pin Assemblies, Locator Cutting Tools, Flat Ground Pattern Plates, Mold Breaking Strip. All items kept in stock and ready to ship — no delay.

SAFETY FEATURES . . . Foot switch controlled by operator instantly stops machine in any position. Control panel located next to operator at shoulder height for easy control of either station.

RUGGED CONSTRUCTION, QUALITY MATERIALS . . . Ship channel frame — can be leveled easily on any floor. Gas fired ovens fabricated of stainless steel with heavy high temperature insulation.

Oven door is air operated for quick, positive and shock free operation. Most efficient pattern heating and curing principle that can be applied. Simplified controls — 2 Sealed panel boxes, one for electrical, one for valve equipment.

All parts accessible for easy maintenance.

BONDING FIXTURE . . . Easy to Use — Simple to Operate — Perfect Bonding Every Time — Eliminates Finning at Parting Line — No set-up time needed — 2068 holes in pressure plates makes it easy to place pressure pins around casting contour.

Safe to operate. Requires two hands to start automatically timed cycle. No operator attention needed.

SHELL PROCESS, INC.

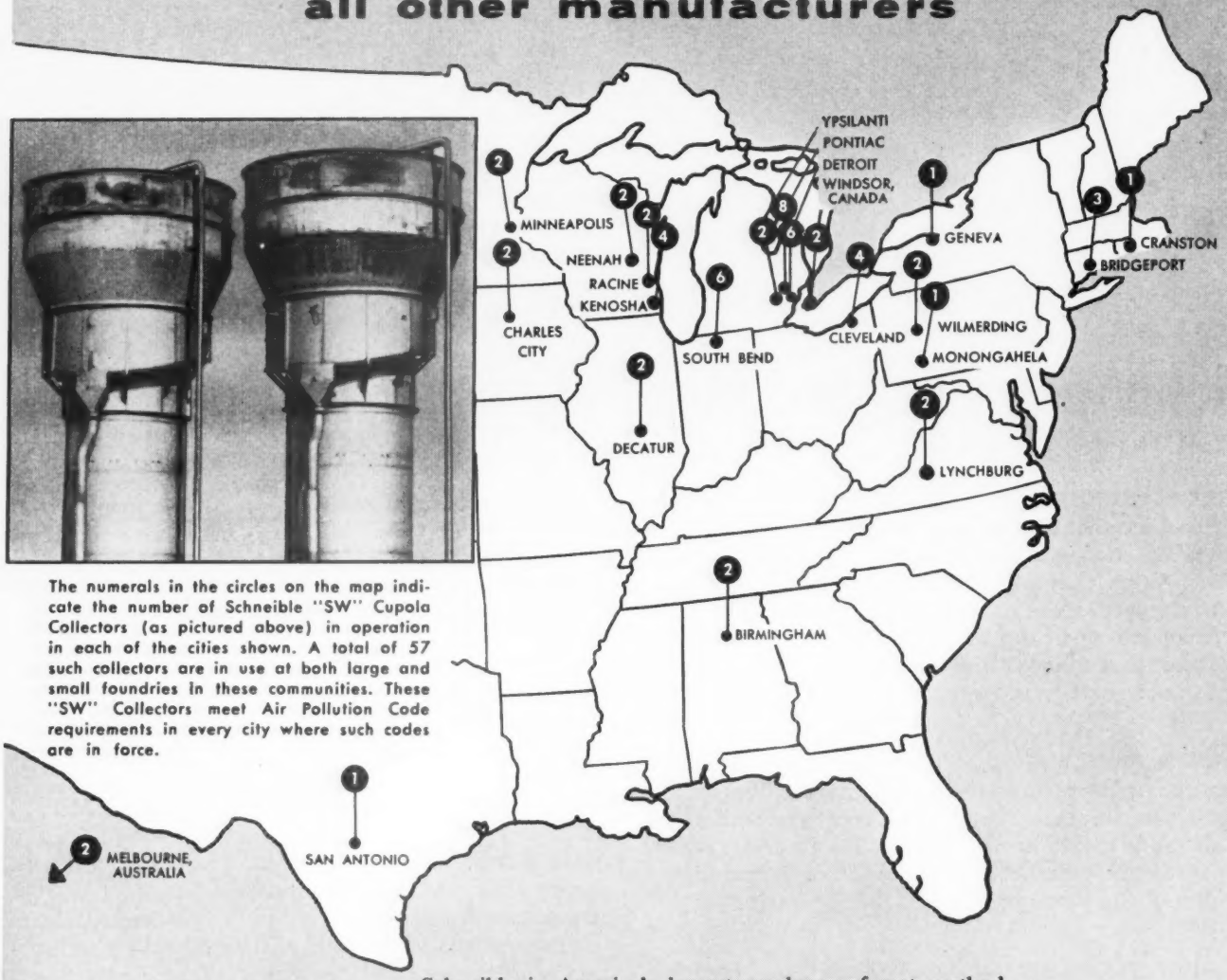
347 McKINSTRY AVENUE, CHICOPEE, MASS.

Manufacturers of Shell Molding Machines and Allied Equipment

INDUSTRY-WIDE COVERAGE..

there are more "SW" Cupola Collectors in operation today than those of all other manufacturers

The numerals in the circles on the map indicate the number of Schneible "SW" Cupola Collectors (as pictured above) in operation in each of the cities shown. A total of 57 such collectors are in use at both large and small foundries in these communities. These "SW" Collectors meet Air Pollution Code requirements in every city where such codes are in force.



Schneible is America's largest producer of wet method Cupola Collectors for the foundry industry.

For twenty years foundrymen and Schneible engineers have worked hand-in-hand to devise better, more efficient methods of controlling air pollution in the industry.

One of the outgrowths of this close cooperation is the "SW" Cupola Collector which has proven to be by far, the simplest, most economical and efficient collector ever designed for control of Cupola fly-ash and fumes.

Foundrymen in every important industrial center of the country look to Schneible for dust and fume control equipment that gives outstanding performance year after year with minimum maintenance.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

All Schneible Equipment is covered by patents in United States and foreign countries.

CLAUDE B. SCHNEIBLE COMPANY
P. O. Box 81, North End Station • Detroit 2, Michigan
Cable Address: CBSCO
European Licensee: Elex S. A., Zurich, Switzerland

SCHNEIBLE

Late News

JOB SHOPS: While there has been a gradual decline since the war in the proportion of total gray iron castings production accounted for by jobbing foundries, the slippage is less than some of the figures quoted recently. Bureau of Census data for 1954 show that 42 per cent of all miscellaneous gray iron castings were job-shop produced. The highest percentage attained during the last seven years was 46.8 in 1948. It was 46.7 per cent in both 1951 and 1952 and 43.5 in 1953.

If such specialty items as pipe, ingot molds and car wheels are included, the percentage of gray iron castings produced for sale would be considerably higher—for instance, 55 per cent in 1954. Extremely high activity at automotive captive foundries so far this year has depressed the jobbing percentage further; it fell slightly below 40 per cent of the miscellaneous castings total in January.

TITANIUM PRICE CUT: Du Pont company has cut prices of its titanium metal sponge 50 to 55 cents. This is the third major reduction within a year. Price of Grade A-1 ductile sponge was cut 55 cents to $3.95 a pound and Grade A-2 sponge 50 cents to $3.50 a pound.

MORE COKE: A new 24-oven battery has been placed in operation at the Ironton, O., coke plant of Semet-Solvay Division, Allied Chemical & Dye Corp. It replaces a battery recently dismantled at Ironton and restores the number of ovens at Semet's four coke plants to 700. Total annual rated coking capacity is about 3,750,000 tons.

NONFERROUS FOUNDERS: Annual meeting of the Non-Ferrous Founders' Society will be held on Saturday, May 21, at the Congress Hotel, Chicago. The morning session will be devoted to business matters and a discussion of plans for new activities. Speakers at the luncheon and afternoon sessions include: E. C. Hoenicke, general manager, Foundry Division, Eaton Mfg. Co., Detroit, and president, Foundry Educational Foundation, who will speak on the important role of engineering in tomorrow's expanding economy; David C. Minton Jr., associate director, Battelle Memorial Institute, Columbus, O., who will discuss "The Importance of Group Research," and a representative of the Business and Defense Services Administration, Washington, who will bring members up to date on metal market and business conditions.

Annual dinner meeting of the society Saturday evening will be preceded by a cocktail hour tendered by the Chicago chapter. The society's original board of directors will be honored at the dinner.

ALUMINUM ACTIVE: Production of primary aluminum continues to set new records, the Aluminum Association reports. March output reached a new monthly peak of more than 130,000 tons. First-quarter production of nearly 375,000 tons also was a new high and about 7 per cent ahead of the like 1954 period.

February production of primary magnesium ingots was 4646 tons, according to the Magnesium Association. This was a decrease of 8.7 per cent from January and compares with 6446 tons in February, 1954.

CHANGES HANDS: Electronicast Inc., investment casting foundry, has been acquired by P. J. Nilsen, owner of Nilsen Mfg. Co., Addison, Ill. Facilities have been moved to Addison where capacity has been more than doubled. The Electronicast name is retained.

FLUID POWER: Officers elected at the recent annual meeting of the National Fluid Power Association include: President, John E. Erskine, Racine Hydraulics & Machinery Inc., Racine, Wis.; first vice president, O. Wendell Macy, Hydraulic Press Mfg. Co., Mount Gilead, O.; second vice president, J. J. Pippenger, Double A Products Co., Manchester, Mich. The organization's fall meeting will be held Nov. 2-4 at the Edgewater Beach Hotel, Chicago.

PERSONALS: R. R. Deas Jr., works manager, Hamilton Foundry & Machine Co., Hamilton, O., also has been elected vice president of the company . . . Victor M. Rowell is joining the Harry W. Dietert Co., Detroit, as executive vice president. He has been with the Foundry

Products Division, Archer-Daniels-Midland Co., Cleveland . . . John S. Hutchins, president, Ramapo Ajax Division, American Brake Shoe Co., also has been named president of the National Bearing Division . . . Lars E. Ekholm, with Climax Molybdenum Co., New York, since 1946, has been appointed manager of its sales division . . . Charles E. Coulter has been appointed assistant sales manager of the Foundry Products Division, Archer-Daniels-Midland Co., and Louis Lund has been named sales representative of the Rock Island, Ill., territory . . . Robert S. Stevenson succeeds the late William A. Roberts as president of Allis-Chalmers Mfg. Co. . . . Walter H. Kraus, recently production manager, Lake City Malleable Co., Cleveland, has joined West Steel Casting Co., that city, as Cleveland area sales representative.

ACQUIRES FOUNDRY: C. W. Schwenn, formerly vice president and director of manufacturing, Brillion Iron Works Inc., Brillion, Wis., has purchased Waupaca Foundry Inc., Waupaca, Wis. Donald Brunner, recently coreroom and shell molding superintendent at Brillion, will be vice president and superintendent at Waupaca. A producer of gray iron castings, the Waupaca company plans early production of shell molded castings.

OBITUARY: Claude B. Schneible, president, Claude B. Schneible Co., Detroit, died Apr. 15 . . . Carl F. Mayer, president, Carl Mayer Corp., Cleveland, died Apr. 20 . . . K. C. Gardner, chairman of the board, United Engineering & Foundry Co., Pittsburgh, died Apr. 15 . . . W. A. Roberts, president, Allis-Chalmers Mfg. Co., Milwaukee, died Apr. 12 . . . Leo M. Gartland, president, Atlas Foundry Co., Marion, Ind., died recently.

MISCELLANY: Crucible Steel Casting Corp., Milwaukee, has been awarded a plaque by Employers Mutuals of Wausau for improvement in its safety record . . . Kingwell Bros. Ltd., San Francisco, is celebrating the 100th anniversary of the founding of its foundry . . . Walworth Co.'s foundry at East St. Louis, Ill., was destroyed by fire, Apr. 8 . . . Centrifugal Casting Inc. has been formed in Milwaukee; incorporation papers were signed by Morry Mitz, 1236 W. Pierce St., Milwaukee 4.

Prices of Foundry Metals and Coke

(As of April 25, 1955)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$16.50-17.00
OVEN	
Birmingham	$22.65
Buffalo	25.00
Chicago	24.50
Detroit	25.50
Erie, Pa.	25.00
Indianapolis	24.25
Kearny, N. J.	24.50
Lone Star, Tex.	18.50
Milwaukee	25.25
Montreal, Que.	26.25
New England, deld.	26.05
Painesville, O.	25.50
Philadelphia	24.00
Portsmouth, O.	24.00
St. Louis, del.	26.00
St. Paul	23.75
Swedeland, Pa.	24.00
Terre Haute, Ind.	24.05

PIG IRON

(Per gross ton f.o.b. furnace)

	No. 2 Foundry	Malleable
Bethlehem, Pa.	$58.00	$59.00
Birmingham	52.88	....
Buffalo	56.50	57.00
Chicago	56.50	56.50
Cleveland	56.50	56.50
Duluth	56.50	56.50
Erie, Pa.	56.50	56.50
Everett, Mass.	61.00	61.50
Fontana, Calif.	62.50	....
Geneva, Utah	56.50	....
Granite City, Ill.	58.40	58.90
Lone Star, Tex.	52.50	52.50
Neville Island (Pittsburgh)	56.50	56.50
Steelton, Pa.	58.50	59.00
Swedeland, Pa.	58.50	59.00
Toledo, O.	56.50	56.50
Troy, N. Y.	58.50	59.00
Youngstown, O.	....	56.50

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 37.00; tin bronze, No. 225, 48.50; No. 245, 42.25; high-leaded tin bronze, No. 305, 41.00; No. 1 yellow, No. 405, 32.25; manganese bronze, No. 421, 34.75.

ALUMINUM: 99 per cent plus, primary ingots 23.20. Secondary No. 12 alloy 28.50-29.50. Deoxidizing grades: No. 1 30.25-30.50; No. 4 27.00-28.75.

MAGNESIUM: 99.8 per cent notched ingots 29.25, fo.c.b. Freeport, Tex. (10,000 lb or more).

COPPER: Electrolytic 36.00, delivered Connecticut valley.

ZINC: High grade 13.35, delivered. Die casting alloy No. 3 16.00, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$32.00-33.00	**$45.00-46.00	.....	.....	.....	.....	$43.50-44.50
Boston*	**29.00-30.00	**30.00-31.00	.....	.....	**33.00-34.00	.....	.....
Buffalo	32.00-33.00	**37.00-38.00	.....	.....	**42.00-43.00	.....	42.00-43.00
Chicago	34.00-36.00	41.00-42.00	.....	46.00-47.00	46.00-47.00	46.00-47.00	50.00-52.00
Cincinnati*	**33.00-34.00	**39.00-40.00	**35.00	.....	**45.00-46.00	.....	**48.00-49.00
Cleveland	33.00-34.00	43.00-44.00	34.00-35.00	46.00-47.00	46.00-47.00	45.00-46.00	50.00-52.00
Detroit*	**29.50	**37.00	**28.00	**42.00	.....	**35.00	.....
Los Angeles	28.00	**42.00-44.00	.....	.....	.....	.....	.....
New York*	32.00-32.50	32.00-33.00	33.00-34.00	.....	.....	.....	.....
Philadelphia	37.50-38.00	37.00-38.00	41.00	.....	44.00	44.00	.....
Pittsburgh	35.00-36.00	39.00-40.00	33.00-34.00	.....	43.00-44.00	.....	50.00-52.00
St. Louis*	31.00	40.00	33.00	42.00	.....	.....	46.00
San Francisco	27.00	40.00-43.00	36.00	39.00	48.00	.....	.....
Seattle	33.00	**36.00-40.00	28.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point.

Get ALL THESE 12 ADVANTAGES IN ONE READY-TO-USE CORE PASTE

LYQUAGRIP*

1. Ready mixed, uniform at all times
2. Light colored, odorless, non-corrosive, non-fermenting
3. Dries rapidly at room temperatures
4. Unaffected by normal storage
5. Will not boil or blister
6. No appreciable gas generation
7. Pasted joints are stronger than core
8. Unaffected by mold humidity
9. Will not harm steel, brass, bronze
10. Extra strong, uses 1/3 to 1/5 as much paste
11. Cores may be reheated without damaging pasted joints
12. Washes off hands and tools easily with warm water

*Trade Mark Reg.

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LYQUAFLOUR
For cleaner surfaces, better shake-out

JOINT SEAL
Plastic compound for perfect sealing

LYQUAFACE
The liquid sand grain coating

DOB-IT
Ready-to-use core mudding compound

YOU'LL DO A BETTER JOB

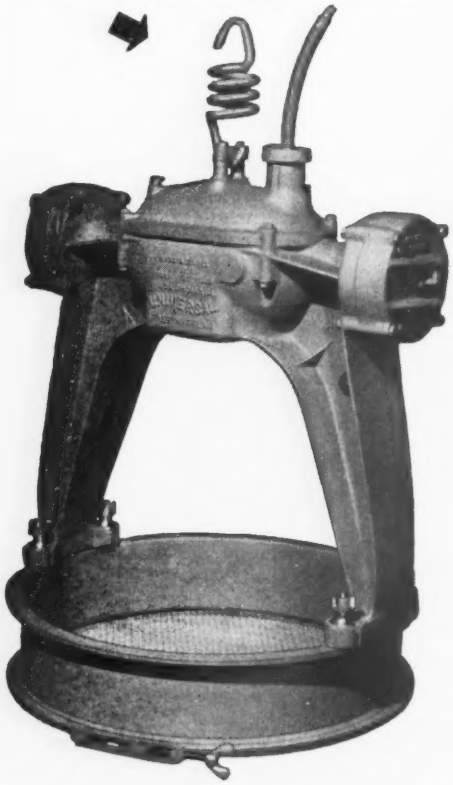
with H. V. ADAMS DESIGNED

HIGH EFFICIENCY FOUNDRY TOOLS

"UNIVERSAL FREE WHEELING"

FOUNDRY SAND RIDDLE

with the Double Eight Vibration

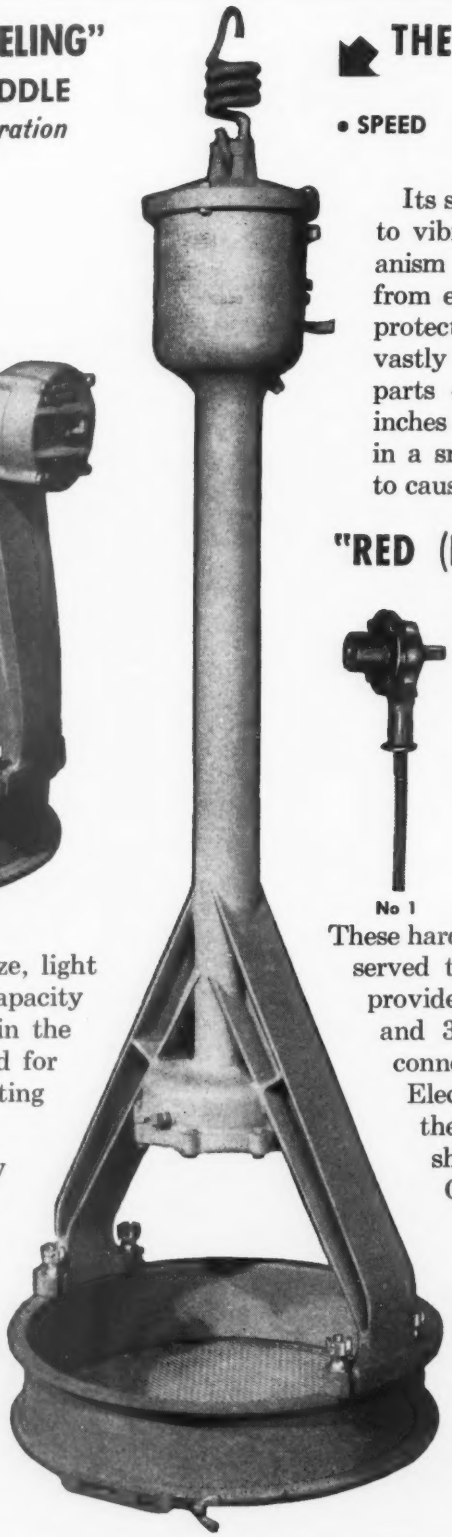


Because of its convenient size, light weight and good riddling capacity it long has been a favorite in the foundry. It also can be used for mixing core sand or for sifting sand directly into molds.

The mechanism is entirely enclosed protecting it from harmful dust and grit.

The main frame is cast in very strong tough aluminum.

It uses quick change ferruled sieves with 20 in. diameter sifting area. There are no loose wires to harm hands.



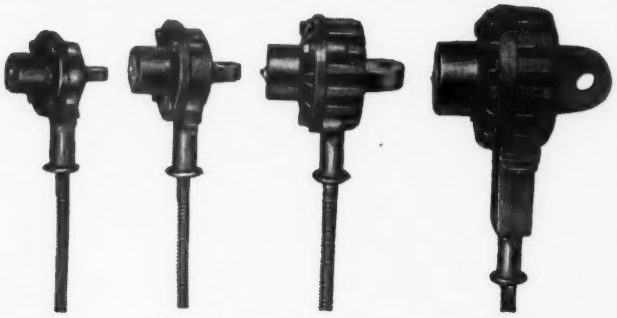
THE "ROTOPLANE" SPEED SIFTER

WILL GIVE YOU

• SPEED • ECONOMY • SAFETY • LONGER LIFE
• GREATER SIFTING CAPACITY

Its sturdy one-piece frame and long shaft add to vibration effectiveness. The sealed-in mechanism assures protection of motor and bearings from exposure to dust and grit. This sealed in protection and "Rotoplane's" free-rotary action vastly increase bearing life. No exposed moving parts endanger the operator. Sieves have 20 inches diameter clear sifting area—are mounted in a smooth steel ferrule with no jagged edges to cause dangerous cuts and scratches.

"RED (Devil) ELECTRIC" VIBRATORS



No 1 No. 2 No. 5 No. 9

These hard hitting Adams designed Vibrators have served the foundries for over 30 years. They are provided with a 6 foot 3 wire authorized cable and 3 wire grounded connector which, when connected with our 3 wire grounded Red Electric Knee Switch, automatically grounds the vibrator protecting the worker from shock. The vibrators have passed the U. S. Government code inspection.

Other Foundry Products:

- No. 11 NOISELESS TYPE VIBRATOR
- A-20 ELECTRIC VIBRATOR
- RED ELECTRIC KNEE SWITCHES
- "ROTO" ADJUSTABLE BIN VIBRATOR
- 2 MIN. UNIVERSAL FINENESS TEST SIFTER.
- UNIVERSAL TRIPOD CARRIER

ORDER ALL SIFTERS AND VIBRATORS WITH GROUND WIRE!!

FOUNDRY SUPPLIES MANUFACTURING CO., NOT INC.

2221 Orchard Street - Chicago 14, Illinois

Established 1918 Cable Address: "Rotoplane Chicago" H. V. ADAMS, Mgr.

"More Combustion Information with Cities Service Heat Prover"

says Keystone Steel & Wire Co.

The Keystone Steel & Wire Company of Peoria, Illinois, is one of many companies now taking advantage of the portable Heat Prover . . . the remarkable combustion analysis instrument supplied and maintained free by Cities Service.

Says Keystone official, Glen Sharp: "For day to day use on the shop floor, the Heat Prover is, in my opinion, the most convenient and practical device available today. We use it throughout the plant for practically every kind of combustion analysis. It is particularly valuable where multiple fuels are used, in cases where both combustibles and free oxygen are present in the flue gas, and again, where normal combustion products are involved in the process itself. It gives simultaneous readings of oxygen and combustibles, and permits continuous explorations of the sampled area if desired. All these advantages make the Heat Prover ideal for Open Hearth work."

The Cities Service Heat Prover is not a product you buy, but a service we supply . . . free! For more information, contact your nearest Cities Service office or write Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

IRON AND STEEL SHOPS SAVE WITH TRULINE®

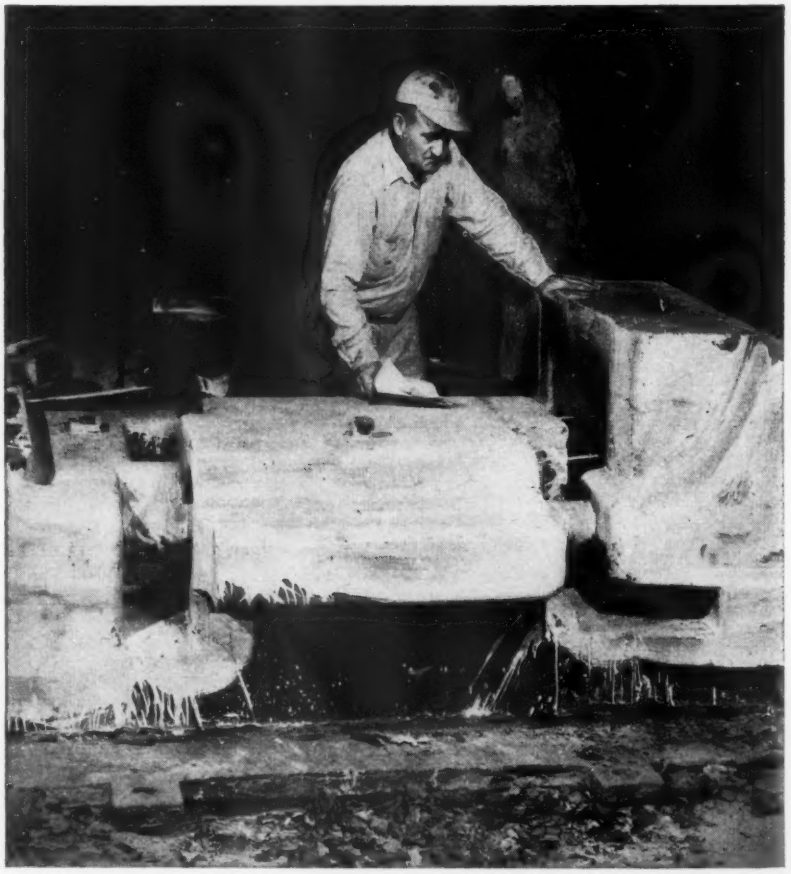
Today's accent on economy offers foundrymen convincing reasons why they should use Truline Binder in core sands. Savings in both man-hours and material costs are obtained in producing quality castings.

Iron shops using Truline for gravel and black sand cores report as high as 50 per cent reduction in shake-out and baking time. The high baked strength tends to eliminate core breakage. In some cases, iron foundries have successfully used Truline in a mixture of half heap sand with new, for medium and large core work.

Truline gives faster and more uniform baking—smoother, cleaner casting surfaces. Steel shops report its high efficiency in core facing sands, backing sands, and pouring cup mixes. Truline is equally effective for skin dry and dry sand molds. It has high resistance to moisture pickup.

Let us give you the up-to-date story on how Truline can help you save time and money.

BAKES OVERNIGHT—Iron shops solve baking bottlenecks by using Truline. This core was baked thoroughly in one night at 400°F.—halving the time required with other binders.



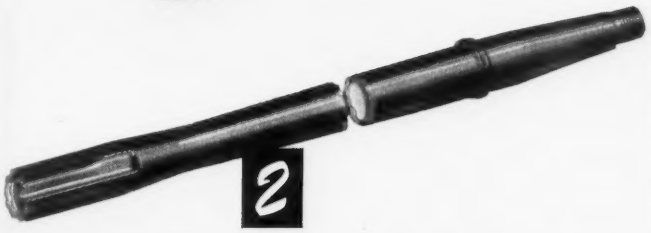
COLLAPSES QUICKLY—Truline helps prevent cracked castings, even where thickness of metal sections varies from one and one-half inches to eight, because cores collapse easier.

Naval Stores Department
HERCULES POWDER COMPANY
INCORPORATED
920 King St., Wilmington 99, Delaware

NF54-2

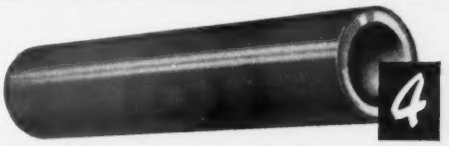
7 WAYS to SAVE MONEY with TOCCO* Induction Hardening

Cost was reduced 94% when heat-treatment of this corn-harvester part was changed from carburizing to TOCCO-hardening, 9½c saved on every piece — $4750 on each 50,000 piece batch, plus an hourly production increase from 120 to 300 pieces per hour.

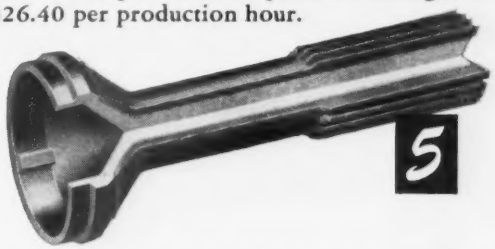


$375 per day! When Salisbury Axle switched to TOCCO-hardening axle shafts. Less machining—30 seconds instead of 2 minutes—means lower tool cost. Also production zoomed from 50 to 120 per hour. TOCCO hardened shafts have 200% greater torsional life.

Kearney & Trecker Corp. reduced the cost of hardening this milling machine part from $1.57 to 10c apiece. In addition TOCCO made possible a switch from alloy to S.A.E. 1045 steel—saving another 11c per piece in material cost. Kearney & Trecker hardens 140 different parts on one TOCCO unit.

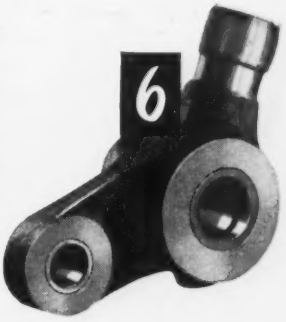


Thompson Products Ltd. boosted production of these automotive wrist pins from 500 to 1200 per hour when they switched to TOCCO-hardening. Costs fell from $5.45 to $3.25 per hundred parts—a savings of 2c per pin, $26.40 per production hour.



Mechanics Universal Joint Division of Borg-Warner reports a 69% savings in the hardening of stub ends for propeller shafts. TOCCO also upped production from 35 to 112 parts per hour—over three times as fast as conventional heating methods.

Lima-Hamilton Corporation adopted TOCCO for hardening this shifting lever. Results: a savings of 4c per piece—$25 per production hour. TOCCO costs only 17% of former heating method. This is only 1 of 139 parts TOCCO-hardened by Lima-Hamilton Corp. All show savings over usual heating methods.



7 Number 7—the lucky number—is up to you. Why not add your name to the list of companies who use TOCCO Induction Heating to increase production, improve products and lower costs. TOCCO engineers are ready to survey your plant for similar cost-saving results—without obligation, of course.

THE OHIO CRANKSHAFT COMPANY

TOCCO

*Trade Mark Reg. U. S. Pat. Off.

Mail Coupon Today

NEW FREE BULLETIN

THE OHIO CRANKSHAFT CO.
Dept. F-5, Cleveland 1, Ohio

Please send copy of "Typical Results of TOCCO Induction Hardening and Heat Treating."

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Position_____

Company_____

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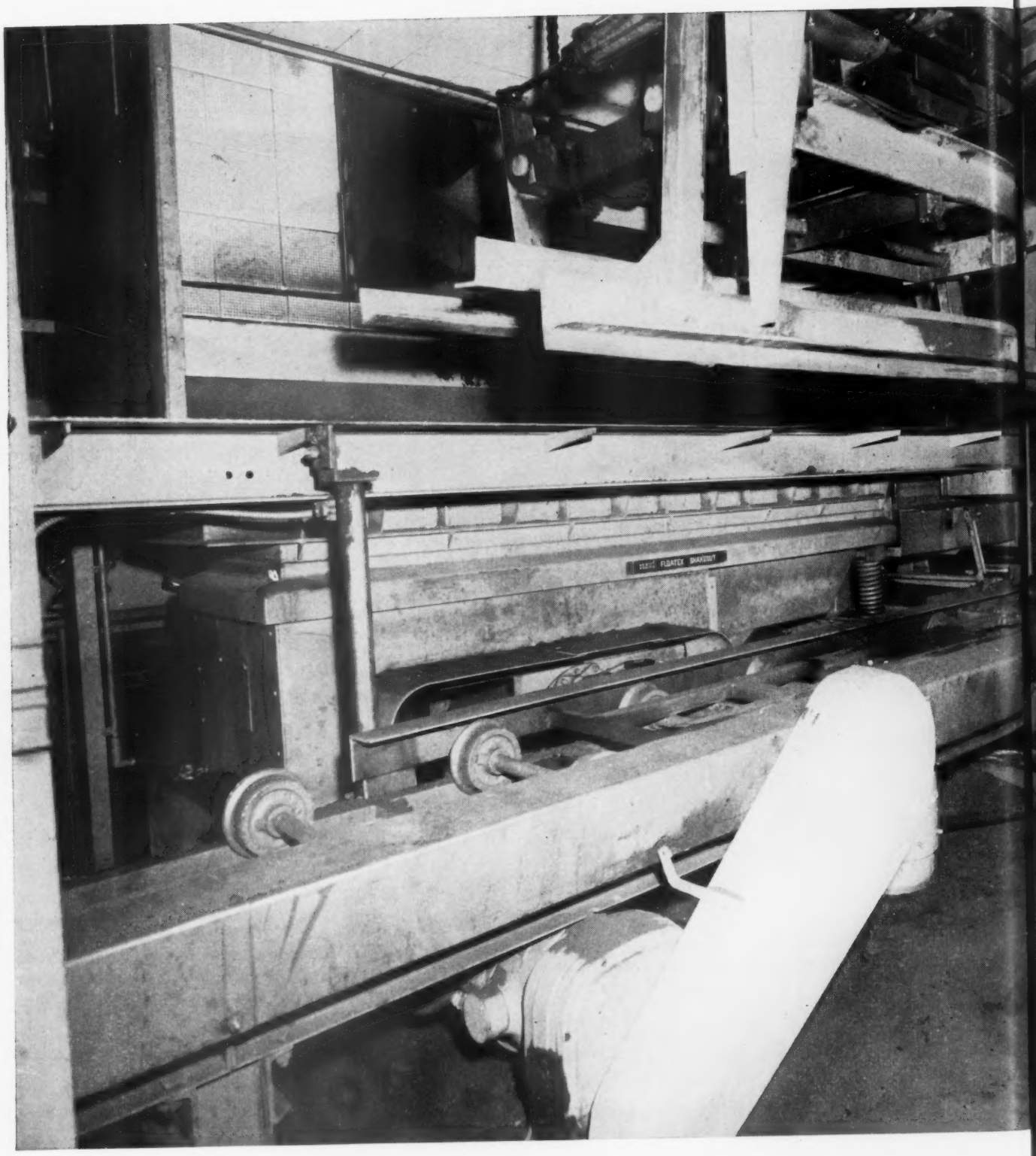
City_____ Zone____ State_____

Mechanization Pays Off a

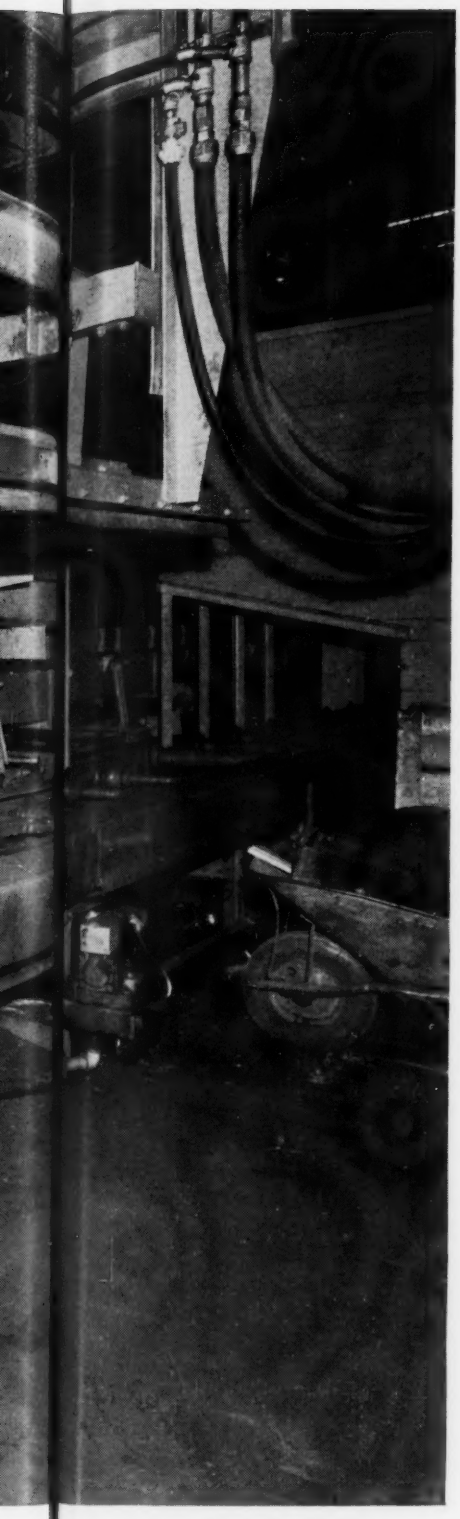


Hewitt-Robins

HEWITT-ROBINS

STAMFORD, CONNECTICUT

f at American Brake Shoe



EQUIPMENT: One Hewitt-Robins triple-deck 4' x 12' Floatex Shakeout and double-deck 30" x 85' 0" Vibrating Conveyor—Two Belt and Bucket Elevators—Three 20" and five 24" Hewitt-Robins Belt Conveyors.

LOCATION: Pomona Foundry of the Brake Shoe & Castings Division, American Brake Shoe Company, Pomona, California.

PERFORMANCE: Hewitt-Robins Floatex Shakeout with special triple deck construction simultaneously handles 10 flasks, rapidly cleans castings and separates sand. Castings are fed to top deck of vibrating conveyor, sprued and sorted. Chill blocks are also reclaimed while sprues discharge over end of top deck to tote boxes for salvage. Vibrating conveyor handles sand on lower deck to fine screen and lump-breaker for reduction and cleaning. Belt conveyors and Belt and Bucket elevators provide continuous flow of material for the sand system.

RESULTS: Only three men required to shakeout, sprue and sort 5200 castings per 8 hour shift . . . shakeout production per man hour greatly increased.

ENGINEERING DATA

Floatex® Shakeouts: Single units with decks from 2' x 2' to 8' x 10'. Multiple unit arrangements up to 16' x 33' and capacities to 300,000 lbs.

Vibrating Conveyors: 8" to 48" wide, up to 150' length with one drive. Capacity to 200 TPH of 100 lbs. cu. ft. material at horizontal setting. Carries hot-cold, dry-moist, fine-large, loose or packaged materials.

Belt Conveyor Systems: Engineered and Sectional . . . Engineered: designed to suit, level or high lifts, light or heavy duty, all components matched to service, widths 14" to 72". Sectionals: standard units from stock complete with all components, 24" and 42" deep trusses, widths 18" to 36", motors to 30 HP.

Belt and Bucket Elevators: Standard centrifugal widths 6" to 18", standard continuous widths 9" to 26".

Here is a partial list of

HEWITT-ROBINS PRODUCTS

that will help you cut handling costs and increase operating efficiency.

MACHINERY

Belt Conveyors
Belt & Bucket Elevators
Car Shakeouts
Conveyor Idlers
Dewaterizers
Mechanical Feeders
Foundry Shakeouts
Mine Conveyors
Reclaiming Systems
Screen Cloth
Stackers & Trippers
Vibrating Conveyors & Screens

INDUSTRIAL RUBBER PRODUCTS

BELTING:
Conveyor
Elevator
Transmission

HOSE:
Acid
Air & Air Drill
Barge Loading
Dust Suction
Fire
Fuel Oil & Gasoline
Gasoline Pump
Mud Pump Suction
Oil Suction & Discharge
Propane-Butane
Road Builders'
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Sand Suction
Sea Loading
Servall®, All-Service
Steam
Tank Car & Tank Truck
Vacuum & Air Brake
Water & Water Suction
Welding, Twin-Weld®

MOLDED RUBBER PRODUCTS

•

For information and service on industrial rubber products, contact your Hewitt-Robins Industrial Supply Distributor. Through his complete stock of Hewitt-Robins Rubber Products, and his familiarity with local field conditions, he can fill your supply needs promptly and correctly. See Classified Phone Book for the Hewitt-Robins Industrial Supply Distributor serving your area.

6010

S INCORPORATED

T

Foundry Shakeouts—Conveyor Belting—Conveyor Machinery—Industrial Hose—Vibrating Screens—Vibrating Conveyors—Design, Manufacture, Engineering and Erection of Complete Bulk Materials Handling Systems.

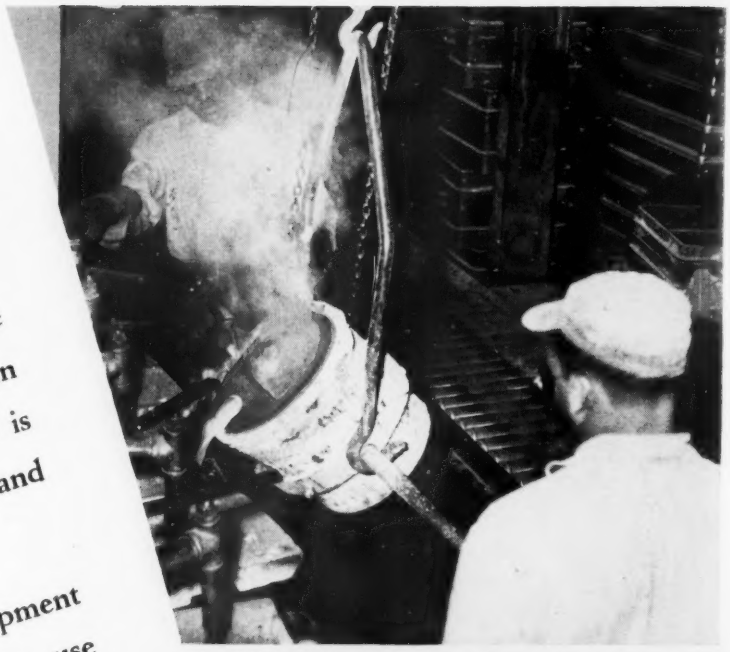
Safeguard

THAT MOLTEN METAL FROM FURNACE TO FLASKS!

Use Crucibles or preformed ladle liners for carrying. When melting in stationary furnaces, the problem is simple: Just lift out the Crucible and carry it to the molds.

With other melting equipment such as tilting Crucible furnaces, use standard Crucibles or preformed liners made to fit any standard steel ladle. They are more economical.

Protect the molten metal from contamination or undue chilling all the way.



Scene in bronze valve foundry of the Belknap Manufacturing Company, Bridgeport, Conn. Illustrates the use of preformed ladle liner, in this case, made with skimmer and bottom pour tube. Pure metal is assured by automatic separation from slag and dross. Capacity of liner, 250 lbs. brass.

GET YOUR COPY OF CRUCIBLE MELTER'S HANDBOOK. MAILED FREE.

FOR CARRYING...

CRUCIBLES

OR

LADLE LINERS

Crucible

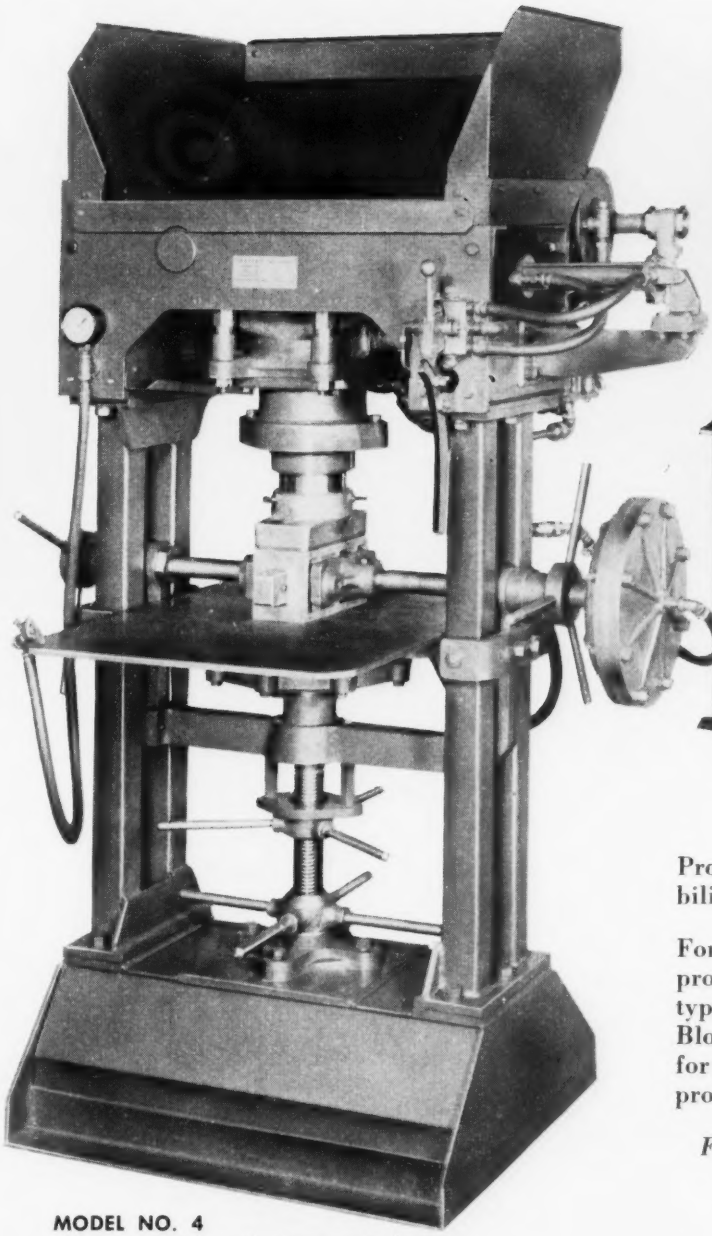
MANUFACTURERS ASSOCIATION

27 WILLIAM STREET NEW YORK 5, N. Y.

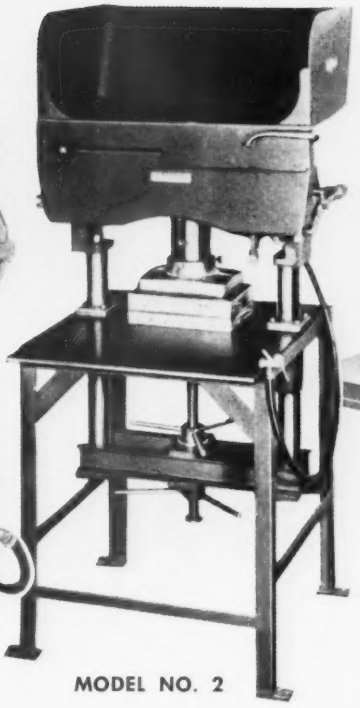
THESE FIRMS CAN TAKE CARE OF ALL YOUR REQUIREMENTS FOR CRUCIBLE MELTING

VESUVIUS CRUCIBLE CO.
JOSEPH DIXON CRUCIBLE CO.
LAVA CRUCIBLE-REFRACTORIES CO.
AMERICAN REFRACTORIES & CRUCIBLE CORP.
ELECTRO REFRACTORIES & ABRASIVES CORP.
ROSS-TACONY CRUCIBLE CO.

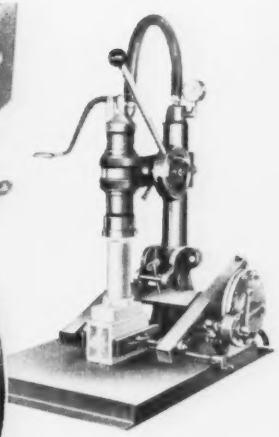
Redford CORE BLOWERS



MODEL NO. 4
(Also available with draw cylinder)



MODEL NO. 2



BENCH TYPE

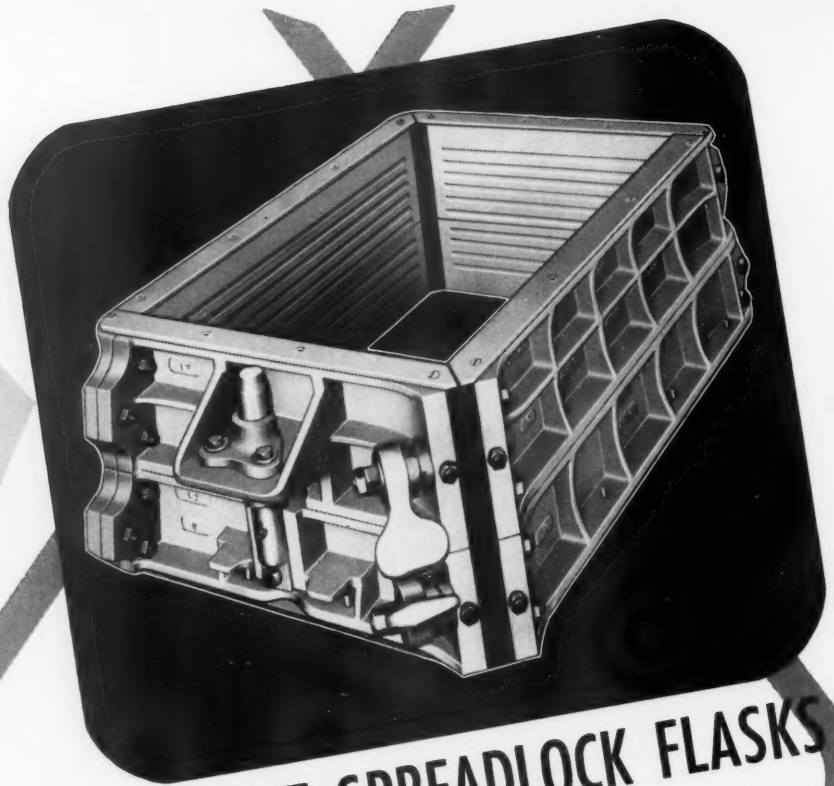
Proven performance — simplicity — flexibility — power — speed.

For 10 years now Redford has kept pace with progress in the foundry. From the first bench type to the new No. 4 . . . all Redford Core Blowers are designed to meet your demand for better cores at lower cost, regardless of production requirements.

For complete information, write for our detailed literature.

Redford IRON & EQUIPMENT CO.

20733 GLENDALE AVENUE • DETROIT 23, MICHIGAN • PHONE: KENWOOD 1-8611



SAND-FREE CORNERS

Corner gaps completely closed by long-life, replaceable live rubber inserts.

FREMONT SPREADLOCK FLASKS

PERFECT ALIGNMENT

guaranteed by one foolproof GROOVLOCK pin. Solid, bolted and welded corners.

FREMONT STANDARD SLIP FLASKS

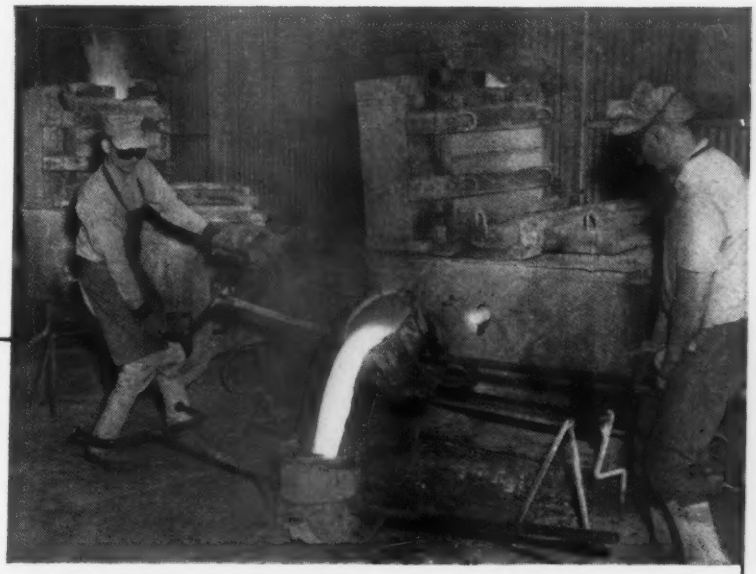
Write today for free literature and prices.
All orders given prompt attention.

THE FREMONT FLASK COMPANY • FREMONT, OHIO

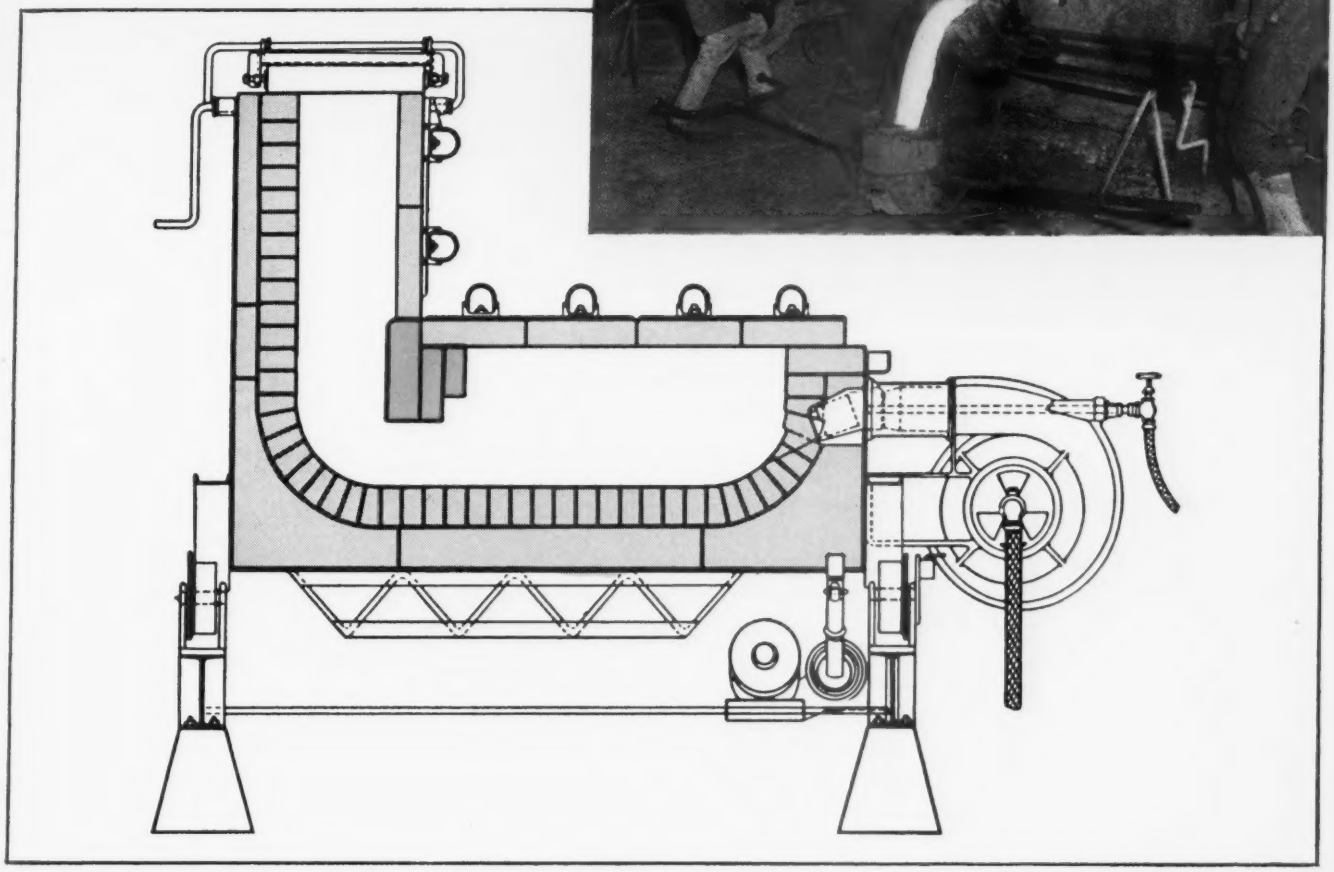
LIGHTER, STURDIER MAGNESIUM FLASKS • CAST IRON AND ALUMINUM JACKETS

Another Norton Rx *on the job!*

CRYSTOLON* baffle plates contribute to the high melting efficiency of Reda reverberatory furnaces



Reladling ductile iron from a Reda reverberatory furnace for ferrosilicon addition. These furnaces are designed for fast, low cost melting of both ferrous and non-ferrous alloys.



Cross-section of a reverberatory furnace manufactured by the Reda Pump Co. of Bartlesville, Okla. Charge is through the stack and the metal is heated by direct impingement of the flame passing over the metal bath and by reflected heat from roof and side walls. Melting takes place at base of stack, where CRYSTOLON baffle plates (shown in color) are the Norton Rx — an expertly engineered refractory prescription — for this critical spot.

CRYSTOLON refractory material is *engineered* to combine great physical strength with exceptional resistance to thermal shock, slag penetration and chemical attack. It will withstand temperatures up to 3050°F, and has up to 15 times the resistance of ordinary fire clay to erosion and corrosion.

That is why CRYSTOLON baffle plates were *prescribed* for Reda furnaces — adding another to the long list of highly successful Norton Rx's for the metal melting field.

Whatever your own furnace operations may be, there is a Norton Rx that will help you to save time, labor and money. For information about Norton CRYSTOLON*, ALUNDUM*, MAGNORITE* and FUSED STABILIZED ZIRCONIA refractories — standard or special shapes or cements — see your Norton representative. Or write to NORTON COMPANY, Refractories Division, 304 New Bond Street, Worcester 6, Mass. *Canadian Representative:* A. P. Green Fire Brick Co., Ltd., Toronto 5, Ontario.

NORTON

REFRACTORIES

Engineered... Rx... Prescribed

Making better products... to make your products better

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

LET'S KICK IT AROUND!

BY Tom Barlow

There was young foundryman from _____,
In a new process, some money he sank.
He didn't have to cut price
He made castings so nice
Now, he has lots of friends at the bank.

Let's stop trying to *meet* competition; *be* competition! Let the other guy meet *your* competition!

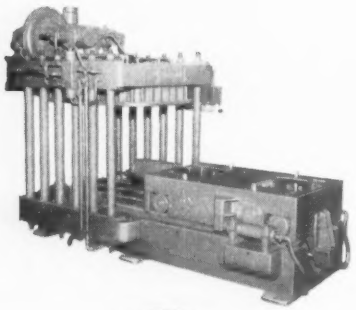
Every squib should start with a startling (from the English "start") statement. Are you properly startled or are you already reading the next page? Go ahead—we don't care—it's our ad. Isn't that a dirty trick?

Down in Texas, there was, or is, or will be (depending on when you read this) a convention to discuss progress in the foundry industry. But there isn't a paper describing the most important change of all.

The most important improvement in foundry practice in the last fifty years is attitude. Foundrymen, consciously or sub-consciously, are adopting the attitude that progress, prosperity and a stable foundry market are based on knowledge—not a price. Better castings mean a better foundry industry. Competition (of long time value) must be based on improved practice. Next time a purchasing agent tells you to "sharpen your pencil," use the pencil to figure out how to make a better casting, higher quality, less scrap, lower cost or faster production. A pencil should be used for more than figuring how little profit you can live on.

The above is not new, but I believe there is today a greater thirst for knowledge and improvement. (Foundrymen, in general, have a reputation for being at least normally thirsty.) Some of the new developments of the last ten years would have died on the vine 20 years ago for lack of desire. Some of the many improvements of 20 years ago were reluctantly accepted—some were even imposed on the industry from outside.

Today foundrymen seem to want to make better castings, use better molding methods, better pattern equipment, better melting practice and improved sand practice. True, a lot of the glamorous changes in the foundry have to do with automation and higher production. But the higher production techniques are based on better castings. This is so true that we find some being confused as to the real value of a new process. For example, in the new molding processes, high production is the result of mechanization *of* the process—not the result of the process itself. The same mechanization could be superimposed on the older molding methods and possibly give the same economies. The true function of the new methods is quality.



MINERALS International CHEMICALS

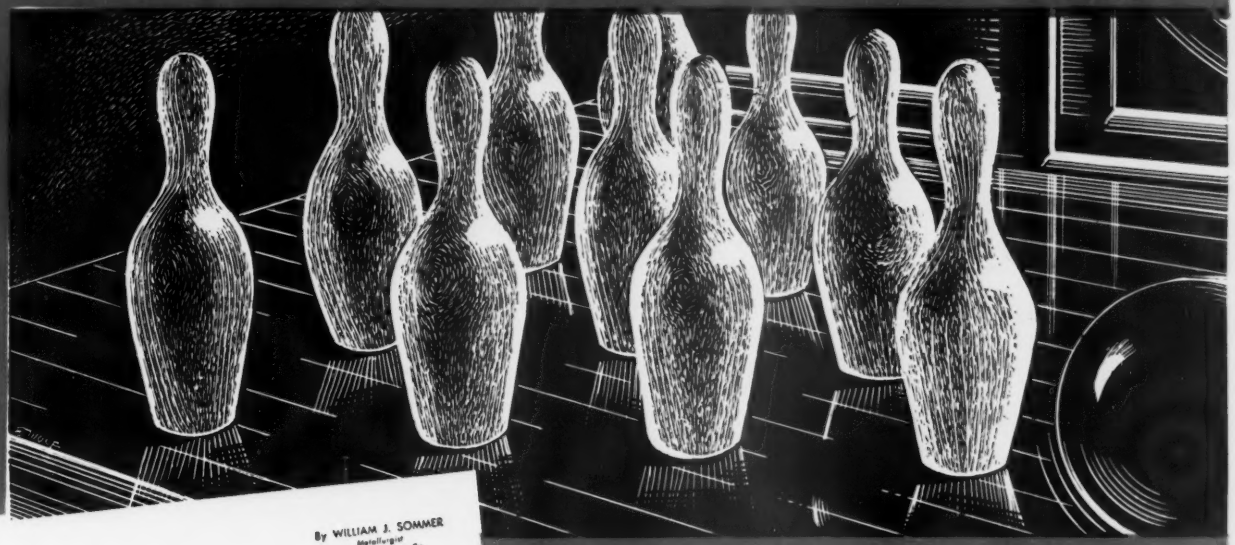
Pressure molding (finally got to it) is a case in point. The prime function of the Taccone Diaform Machine is to develop a uniformly dense mold with minimum distortion and variation—in other words, a better casting. Since the molding cycle is four to five seconds, it lends itself to mechanization and automation. As a result, many of the installations are in high production shops—but the same quality is equally available to the jobbing or short-run shop.

Likewise, Plasti-Bond and Triplact improve flowability of sand to give maximum finish, uniform hardness and dimensional stability—better castings. High flowability sands lend themselves to faster production but the quality of castings is available at any speed—fast or slow.

Put a highly flowable sand in a Taccone Machine and you have High Pressure Molding—a method of producing quality castings. Your customer wants to buy quality castings. Do you dig me?

EASTERN CLAY PRODUCTS DEPT. INTERNATIONAL MINERALS & CHEMICAL CORPORATION

uniformity



By WILLIAM J. SOMMER
Metallurgist
Plainville Casting Co.
Plainville, Conn.

Quality Control:

IT'S IN THE REACH OF SMALL FOUNDRIES

Look at your inspection setup. If you're making chemical analyses, inspecting patterns, or castings, chances are you have basic elements needed to start quality control program

WITH THE foundry industry as a whole becoming more and more quality conscious and the larger companies setting up elaborate quality control p... many smaller found... to

ing group are all too interested in getting the work out and meeting delivery dates. If possible by-pass your standards department or time study men. Their ... concern is getting rate of ... up and de-

reason for the scrap. The type of scrap record you keep is optional, but it should contain such pertinent data as date, customer's name, pattern number, total ca... total scr...

let uniform DIXIE BOND help you obtain *quality control*

Uniformity in materials all through the plant, — that is one big, indispensable aid toward the all-important end of quality control. Your molding sand must be uniform. For that uniformity you can depend upon Dixie Bond, produced under the strictest of laboratory control.

That isn't all. With Dixie you get also fast, easy shake-out; longer-lived flasks, more crack-less castings. You benefit from moderate dry and hot strength, the highest green strength known to the industry, high permeability, high flowability, and a high sintering point.

write for our new **DIXIE BOND** *bulletin*

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DIXIE BOND • BLACK HILLS BENTONITE • TRIPLACT • REVIVO CORE PASTE • REVIVO BOND • BONDACTOR • CUPOLINE • DURA PRODUCTS • WESTONITE

REJECTS Make Dollar Profits Disappear

NATIONAL BENTONITE

Bonds Better to Prevent Rejects

All bentonites are not the same – and the difference between brands may spell the difference between profit and loss on your castings. That's why scores of foundrymen the nation over choose National Bentonite. The exceptionally high quality of this bentonite bonds better molds, helps measureably to prevent costly rejects.

National Bentonite provides exceptionally good green strength, higher hot strength, greater mold permeability, higher tensile strength and other characteristics – all which help eliminate the danger of casting blows, scabs, gas holes, and other defects that waste your money.

National Bentonite is mined from the purest, finest deposits of bentonite in the world. It is processed by the world's largest, most experienced producer of bentonite. National Bentonite is the finest money can buy. Use it and lower your reject loss.

Available from better foundry suppliers everywhere. Write today for specifications and prices.

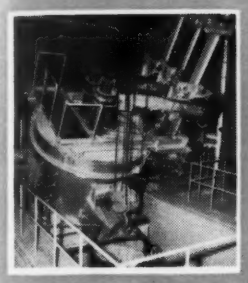
Baroid

Baroid Division ☆ National Lead Company

Bentonite Sales Office: Railway Exchange Building, Chicago 4, Illinois

5024

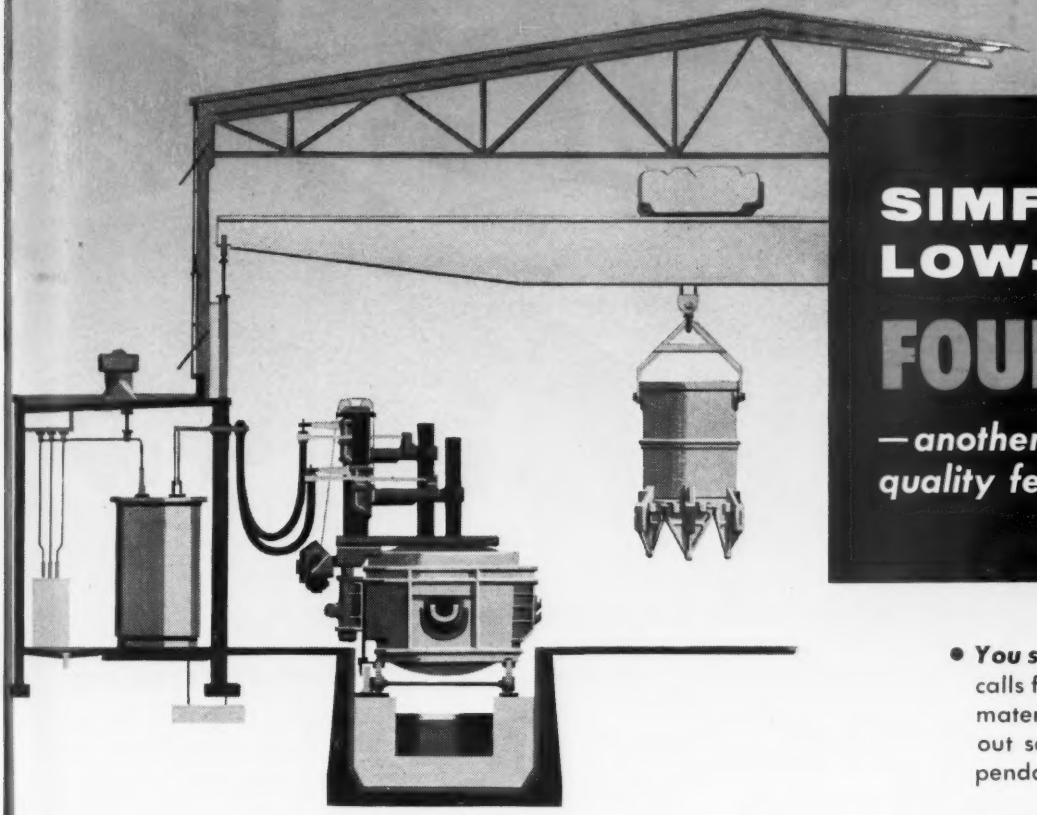
• ONE OF A SERIES OF MESSAGES TO MODERN FOUNDRY MANAGEMENT



SWINDELL

SINCE 1850

FOUNDRY ELECTRIC MELTING FURNACES



SIMPLE, LOW-COST FOUNDATIONS

—another SWINDELL quality feature

- ***You save*** because Swindell design calls for a minimum of excavation, materials and waterproofing, without sacrifices of strength and dependability.
- ***You save*** because Swindell simplicity sharply reduces construction time.

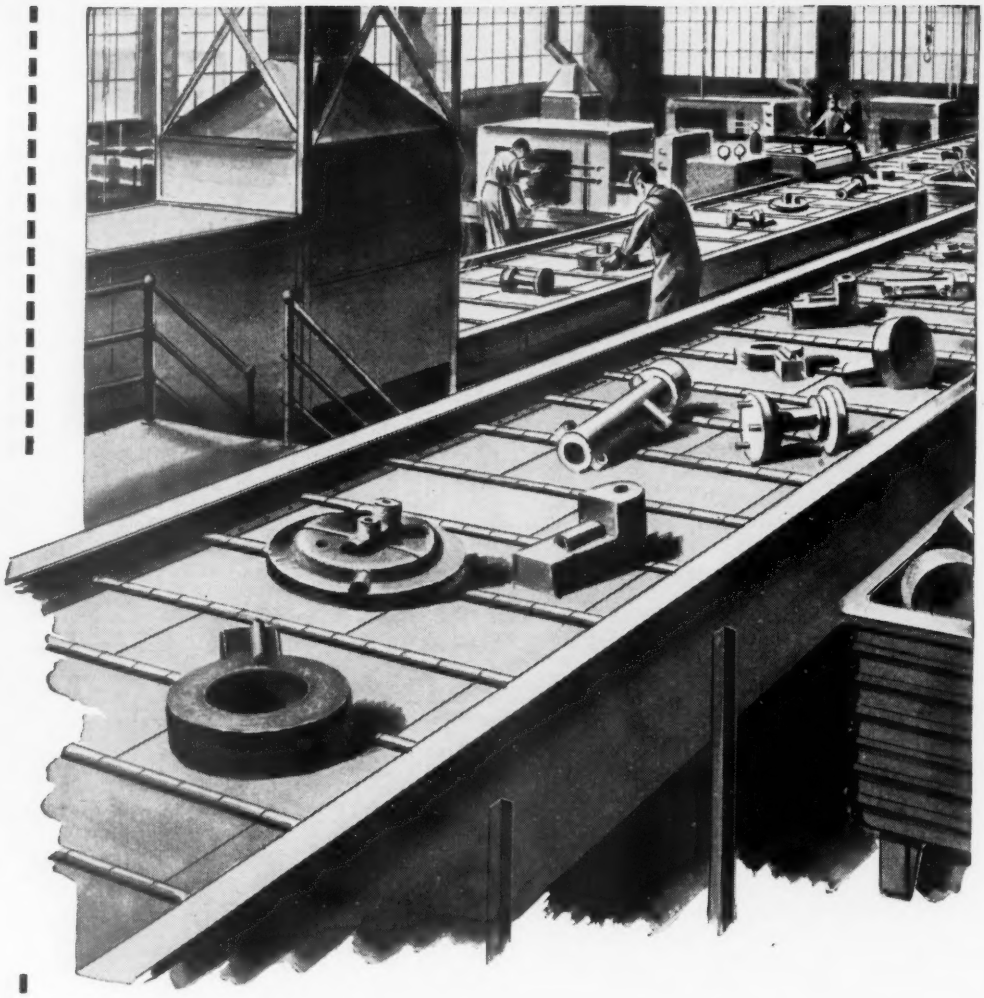
Because SWINDELL's electrode hoist mechanism is on the furnace, cable tunnels and oil piping trenches are eliminated. Because the roof cylinder is integral with the furnace, no special concrete foundation is required. And where trunnion-type furnaces are specified, our hydraulic cylinders are floor-mounted, avoiding potentially fire-hazardous cylinder pits. • Such simplicity and savings are carried through on the component furnace features. At every point, Swindell know-how serves you!

SWINDELL Electric Melting Furnaces for foundry service provide the productivity, low maintenance and long useful life built-in by genuine steel mill design and construction by steel mill melting furnace specialists. Write for a consultation.

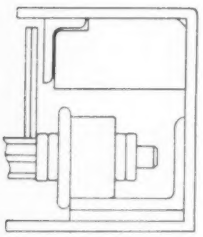
WRITE for your copy of the latest Swindell Electric Melting Furnace Catalog — sent promptly on request.

SWINDELL-DRESSLER
CORPORATION
Designers and Builders of Modern Industrial Furnaces
PITTSBURGH 30, PA.

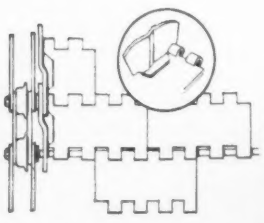
the belt with 9 lives



May-Fran hinged-steel conveyor belt . . . out performs them all in the foundry



Drawing shows construction details of "skirt" which prevents entry of foreign matter and protects side chains.



Outside links incorporate interlocking wings . . . remain positively engaged at all times.

May-Fran Belting is precision formed . . . specifically designed and developed to handle hot, heavy and the most abrasive parts. That's why it has nine lives.

Heavy gauge hinged-steel links are connected in horizontal rows by means of high-carbon steel rods. Side chains become an integral part of the locking wings which remain positively engaged at all times. Link and rod construction eliminates fall-through.

Widths furnished from 6-inches to 6-feet can meet your specifications for a steel conveyor belt of any length or carrying capacity. Either solid or perforated links are available in 2½, 4, 6, 9 and 12-inch pitch lengths. For conveyor belting that out performs, out lives them all . . . specify May-Fran Hinged-Steel Conveyor Belting.

MAY-FRAN ENGINEERING, INC.

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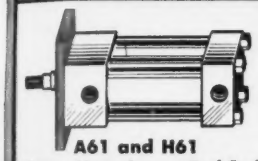
Miller AIR AND HYDRAULIC CYLINDERS AND BOOSTERS "IN STOCK" for immediate delivery...

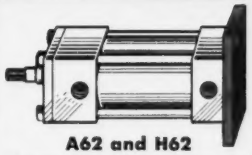
See Miller Bulletins A-105K (Air) and H-104K (Hydraulic) for Complete Dimensions and Engineering Data on these "in-stock" sizes and other Custom Miller Cylinders in bores up to 20" and strokes up to 22 feet.

"IN-STOCK" MODELS

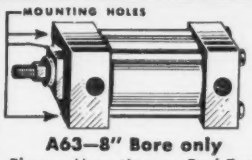
"A" Signifies Miller 200 psi Air Cylinders; "H", 2000 psi Hydraulic Cylinders. Interchangeable Mountings Are Shown In Red On Drawings.



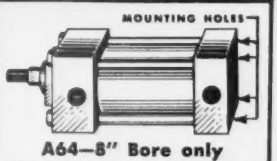
A61 and H61
Flange Mounting on Rod End



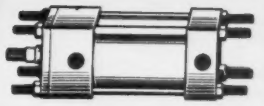
A62 and H62
Flange Mounting on Cap End



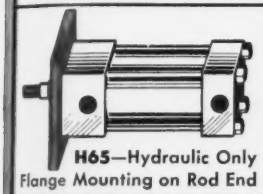
A63—8" Bore only
Flange Mounting on Rod End



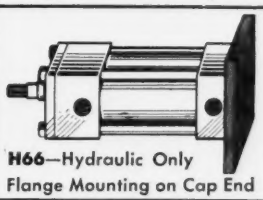
A64—8" Bore only
Flange Mounting on Cap End



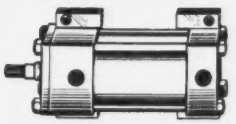
A50 & H50—Tie Rods not extended beyond nuts.
A51 & H51—Tie Rods extended both ends (shown).
A52 & H52—Tie Rods extended. Cap End only.
A53 & H53—Tie Rods Extended. Rod End only.
A54 & H54—Two Tie Rods extended at both ends.



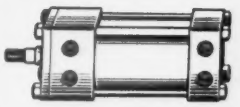
H65—Hydraulic Only
Flange Mounting on Rod End



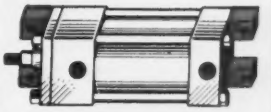
H66—Hydraulic Only
Flange Mounting on Cap End



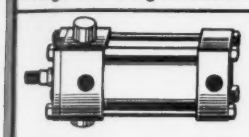
A72 and H72
Side Lug Mounting



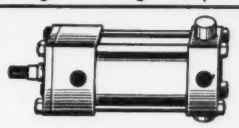
A74 and H74
Side Flush Mounting



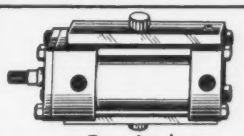
A77 and H77
Side or Foot Mounting



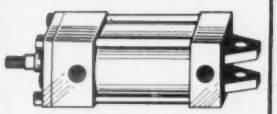
A81 and H81 Trunnion Mounting on Rod End



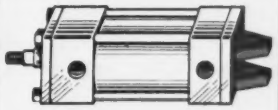
A82 and H82 Trunnion Mounting on Cap End



A83 and H83 Trunnion between Head and Cap (one week delivery)



A84 and H84
Pivot Mounting



A86 and H86
Pivot Mounting

IN STOCK BORES In Inches

"IN-STOCK" STROKES (in Inches)

	BORES	ROD DIA.	ROD TURN DOWN & THREADS		1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
AIR	1½	5/8"	7/16-20	Cushioned																					
				Non-Cush.	1	2	3	4	5	6															
	2	5/8"	7/16-20	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
	2½	5/8"	7/16-20	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
	3¼	1"	¾-16	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
	4	1"	¾-16	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
	5	1"	¾-16	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
	6	1⅜"	1-14	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
	8	1⅜"	1-14	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
HYDRAULIC	1½	5/8"	7/16-20	Cushioned																					
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12									
	2	1"	¾-16	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
	2½	1"	¾-16	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
	3¼	1⅜"	1-14	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
	4	1¾"	1¼-12	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
	5	2"	1½-12	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36

(1) "A" and "H" Models 82, 84 and 86 with strokes over 18" require stop tubes.

Column strength requires larger diameter piston rods for the following:

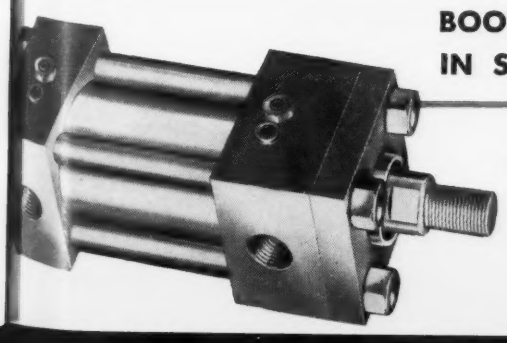
Air Cylinder Models A82, 84, and 86 with strokes inside area (1), when operated at 100 psi and over;

All hydraulic models with strokes inside area (2) and Models H82, 84, and 86 with strokes in area (4), when operated at 2000 psi and over;

Models H82, 84 and 86 with strokes inside area (3), when operated at 1000 psi and over.

Depending upon Trunnion Pin location, "A" and "H" Models 83 with standard diameter piston rods can have longer strokes than Models 82, 84 and 86.

See Miller File #251 for oversize piston rod and stop tube requirements.



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Immediate Delivery on the following Miller 25 to 1 Ratio Boosters (80 psi air input produces 2000 psi hydraulic oil output): Model B4, 5" bore, 1" dia. ram, 6" and 12" strokes; Reciprocating Booster Model DA77-RBA8, 5" bore, 1" dia. ram, 6" stroke. Also Booster Tanks, 5" dia., 6" and 10" heights.

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(Formerly MILLER MOTOR COMPANY)
2034 N. HAWTHORNE AVE. MELROSE PARK, ILL.

AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS

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DELTA . . .

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during the
59th Annual A.F.S. Convention

EVERY DELTA Foundry Product is backed by continuing and exhaustive laboratory research to safeguard quality and maintain absolute uniformity of the finished product. Every step in the manufacturing processes is under strict laboratory control and all raw materials must conform to rigid quality specifications.

Delta Oil Products Co. not only pioneered the development of plastic-type core and mold washes but has continued to lead in the development of new and improved products for the production of better castings — faster and more economically.

Delta sales technicians are ready, at all times, to assist in the more effective and more economical use of core oils, core and mold washes and sand additives for increased efficiency and lower production costs.

FOR SAND

*Permi-Bond (sea coal replacement)
*Sand Conditioning Oils
*96-B Sand Release Agent

FOR SHELL MOLDS

DELTA-Dietert Process Binder 103XX
(For "D" process shell cores.)

CORE AND MOLD WASHES:

FOR STEEL:
*Special Core and Mold Wash Base
*SteelKoat
*PyroKoat-S
*SuperKoat
*ThermoKoat
*Z-Koat
*ZZ-Koat

FOR ALL TYPES OF SAND CAST METALS:
*ThermoKoat
*Z-Koat
*ZZ-Koat

FOR GRAY IRON AND MALLEABLE:
*GraKoat
*BlacKoat
*SuperKoat
*BlacKoat C-2
*BlacKoat C-4
*DriKoat B-3
*DriKoat B-5
*BlacKoat S-5
*PyroKoat-S
*PyroKoat-G

FOR NON-FERROUS METALS:
*NonferrusKoat
*SuperKoat
*GraKoat
*DriKoat F

PARTING COMPOUNDS:

*Partex
*Super Partex
Liquid Parting
Liquid Parting Concentrate 113XX

MUDDING AND PATCHING COMPOUNDS:

*Sliktite
*Ebony

MOLD SEAL COMPOUND
*NO-VEIN COMPOUND
MOLD SURFACE BINDERS—LIQUID
*DRI-BOND
BONDITE
CORE ROD DIP OIL
CORE OILS

LIQUID RESINS AND BINDERS:

155-X Fast-Dri
168-X Fast-Dri

*A Foundry First — by Delta.

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DELTA OIL PRODUCTS CO.

MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

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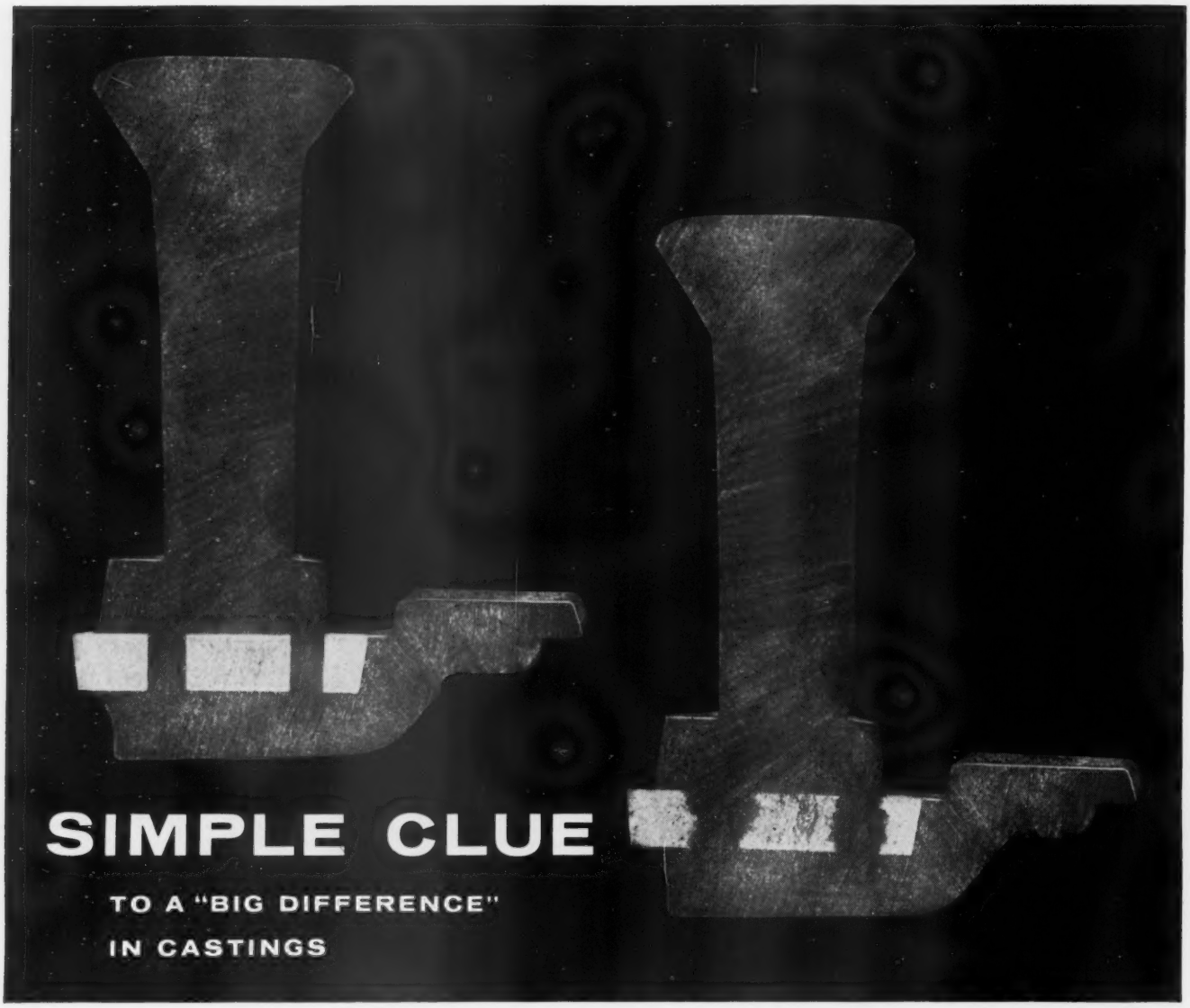

If you are unhappy about your production . . . or your finished costs . . . we would suggest you cut a few sprue sections in two. You may be surprised at what you find.

If you're now using sand strainer cores, we'll bet you find ample evidence of erosion. And it's possible that, even with refractory cores, you'll find some disintegration has taken place.

For all refractory cores are *not* alike, and *Louthan* cores are *proved* to withstand 3,000°F. temperatures without spalling or disintegrating. This is important as it assures closer control of the molten metal, assures that no slag can get through to ruin a casting, saves needless grinding and inspection.

Louthan developed and perfected refractory strainer cores and maintains the highest standards in their production. You'll find them consistently uniform, dimensionally accurate, inexpensive to use and easy to handle. Why not give them a trial in your shop? Write today for full particulars and samples!

Louthan **REFRACTORY STRAINER CORES**

Louthan Mfg. Co., East Liverpool, Ohio (Subsidiary of FERRO® Corporation)

REPRESENTATIVES: FREDERIC B. STEVENS, INC., 1800 18th St., DETROIT 16, MICH.; 93 Stone St., BUFFALO, N. Y.; 36 Shelby St., INDIANAPOLIS 7, IND.; P. O. Box 1716, NEW HAVEN, CONN.; 41 Dovercourt, TORONTO 1, ONT., CAN.; 1262 McDougall St., WINDSOR, ONT., CAN. **FOUNDRY SUPPLY CO.,** 5009 Excelsior Blvd., MINNEAPOLIS 16, MINN.

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Delta 2½" Abrasive Belt Finishing Machine with self-contained, low-cost portable dust collector attached.

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The initial low cost and high production capacity of a Delta Belt Finishing Machine make it the ideal tool for many foundry metal removing operations including casting headers, as well as fast, on-the-spot deburring, sanding, finishing and polishing. By spotting several Delta Belt Finishers around their plants, many foundry men have proved that Delta's *flexibility* helps cut hundreds of costs and speeds-up production.

COSTS LESS TO OPERATE!

It's a completely portable, highly versatile tool that can be quickly shifted to *any* part of your plant. You take the tool to the work instead of the work to the tool, eliminating costly, time-consuming stock handling. It operates both vertically and horizontally and can be assembled into many combinations. Inexpensive, long-wearing abrasive belts are easily and quickly replaced, greatly reducing production time loss.

COSTS LESS TO MAINTAIN!

This Rockwell-built DELTA Belt Finishing Machine is rugged . . . a dependable production tool built to endure rough every day use, year after year. And there are no expensive abrasive wheels to dress or "set-up." Totally enclosed and guarded, it meets *all* safety requirements.

See your Delta Dealer now for proof that the Delta Belt Finishing Machine is the most flexible abrasive tool available. He's listed under "TOOLS" or "MACHINERY" in the classified pages of your phone book. Send the coupon today for all the facts.

DELTA QUALITY POWER TOOLS

Another Product by **Rockwell**

DELTA QUALITY COSTS NO MORE

Delta Power Tool Division, Rockwell Manufacturing Company
706-E North Lexington Avenue, Pittsburgh 8, Pa.

☐ Please send catalog on Delta 2½" Belt Finishing Machine.
☐ Please send name of my nearest Delta Dealer who has the Delta 2½" Belt Finishing Machine on display.

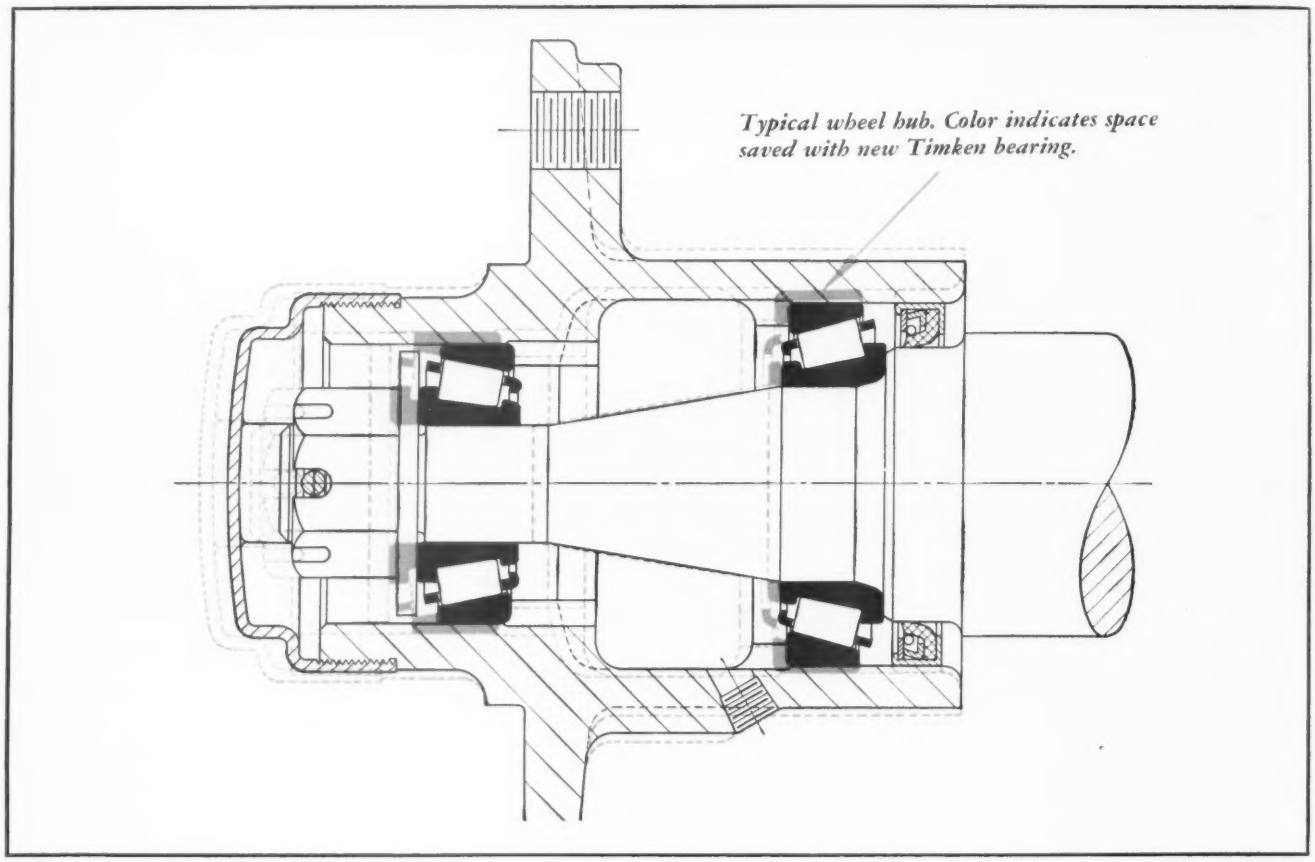
Name_____ Title_____

Company_____

Address_____

City_____ County_____ State_____

Three new TIMKEN® bearings cost less, permit savings in related parts, too



New capacity-packed bearings take up less space than previous designs of same bore sizes

THREE new Timken® tapered roller bearings are now available in bore sizes of ¾", 1¼" and 1⅜". And they cost less than previous bearings of the same bore sizes. Because they take up less space and weigh less, they permit application designs that save in related parts, too. And never has so much bearing capacity been packed into so little space.

These new Timken bearings offer exciting opportunities for savings through redesign of present tapered roller bearing applications. One example is shown in the above diagram of a typical wheel hub. Seals can be smaller and cheaper, hubs can require less metal and less machining, spindles can be made shorter and less costly to machine. All these savings are in addition to the lower cost of the bearings themselves.

Many engineers have already taken advantage of these possibilities and well over 1,000,000 of the new bearings are proving themselves in automobile front wheels and other applications.

The new Timken bearings also make it possible for you to enjoy the advantages of tapered roller bearings in many new applications—and at minimum cost.

Auxiliary parts for use with the new Timken bearings are available from the Timken Company and major closure manufacturers. For full information on the new low-cost Timken bearings and help in designing them into your product, write today to The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN® ... your number 1 bearing **VALUE**

TRADE-MARK REG. U. S. PAT. OFF

TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST ◫ LOADS OR ANY COMBINATION ✳

2000 lbs.
1500 lbs.
1000 lbs.
500 lbs.
100 lbs.

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Variable Speed

AIR HOIST

Variable Speed . . . 1000 lbs., 0 to 38′ per minute . . . 2000 lbs., 0 to 20′ per minute . . . load can be inched or zipped.

AIR-powered for Safety . . . no spark hazard . . . explosion-proof motor . . . can't burn out . . . can't overheat . . . unaffected by dust or fumes.

Lightweight . . . only 28½ lbs. for 1000 lb. hoist . . . 2000 lb. hoist weighs only 47 lbs. Overall length all models, 10½″ to 11⅛″.

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ARO® AIR HOIST

Also . . . Air Tools . . . Lubricating Equipment . . . Aircraft Products . . . Grease Fittings

PURITE

stacks up best for fluxing and desulphurizing

BECAUSE Purite produces higher percentages of finished castings—fewer rejects per ton of metal poured.

BECAUSE Purite gives 100% fluxing action in the cupola —100% desulphurizing action in the ladle.

BECAUSE Purite is time-tested and proved for rapid and unsurpassed desulphurizing uniformity.

BECAUSE Purite permits the use of higher-sulphur raw materials.

BECAUSE Purite is 100% pure fused soda ash—you do not pay for inert materials.

BECAUSE Purite comes in uniform 2-lb. pigs—no weighing or measuring required.

BECAUSE Purite does not crumble—is easy to handle —no waste, no dust.

BECAUSE Purite can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without deterioration.

BECAUSE Purite, the scientific flux for better melting and cleaner iron, is sold by leading foundry supply houses in the United States and Canada.

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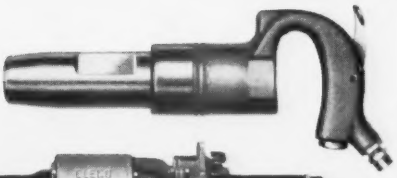
More Production . . .

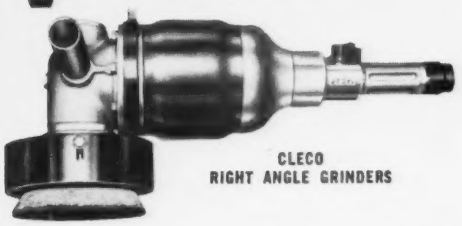
FASTER . . . LESS MAINTENANCE . . . WITH CLECO PNEUMATIC TOOLS AND ACCESSORIES

Welcome!
to the Cleco Plant when you attend the Foundry Convention.
Come out and see why Cleco air tools are made better to last longer.

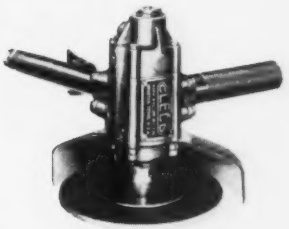


CLECO CHIPPING HAMMERS

CLECO HORIZONTAL GRINDERS



CLECO RIGHT ANGLE GRINDERS



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FOR all your light or heavy duty grinding, ramming, and chipping there's a properly balanced Cleco air tool designed with your particular problem in mind . . . to save you time, money and maintenance.

Backed by the well-known Cleco service . . . and experienced Cleco air tool engineers who know CLECO products, and what they can do for YOU!

Write, wire or phone today for a demonstration in your plant. No obligation, of course.

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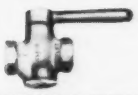
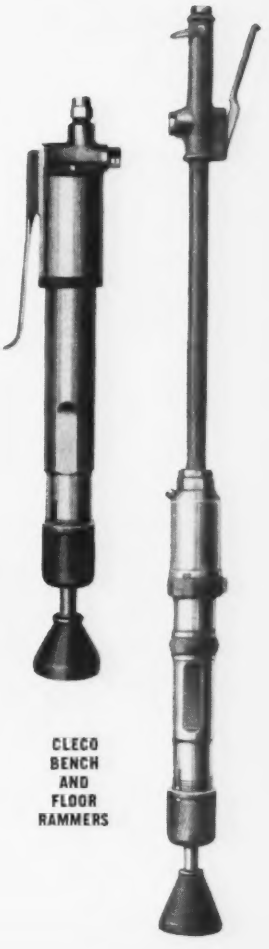
CLECO NIPPLES

CLECO BLOW GUNS



CLECO PRESSURE SEATED VALVES

CLECO COUPLINGS



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Grinders • Sanders • Rotary Drills • Riveters • Backfill Tampers • Chippers • Scaling Tools • Nut Runners • Impact Wrenches • Multiple Spindle Units • Sump Pumps • Paving Breakers • Spike Drivers • Air Line Accessories and Fittings.

A HALF CENTURY OF SERVICE

to the Iron and Steel Industry

Our half century of service to the metals industry has not been simply a matter of expanding productive capacity, nor producing more of the same.

To a large extent, it has been a matter of developing new uses for materials. It has been a problem of finding better products at lower cost . . . of looking continually for ways and means to help the steel and ironmaker meet the demands of his customers for better metals.

Consider our Research Center, for example. It's the most recent addition in our expansion program designed to broaden our service to the metals industry. This service provides our customers with valuable research information for solving alloy problems posed by today's complex and highly specialized needs.

Because a substantial increase in the use of ferro alloys is essential to meet these growing demands, we have expanded our alloy production facilities. We have modernized and stepped up our mining and milling operations. Existing plants have been modernized. New plants have been built. Today—after a half century of steady growth—we are one of the nation's largest producers of ferro alloys.

Through our product diversification . . . our fully integrated mining, milling and smelting operations . . . our research facilities, we have been able to meet and often anticipate the needs of the iron and steel industry.

We take pride therefore in this half century of service. And we are pointing our resources and the energies of our people to another half century of service.

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VANCORAM

Producers of alloys, metals and chemicals

can you use these *Facilities?*

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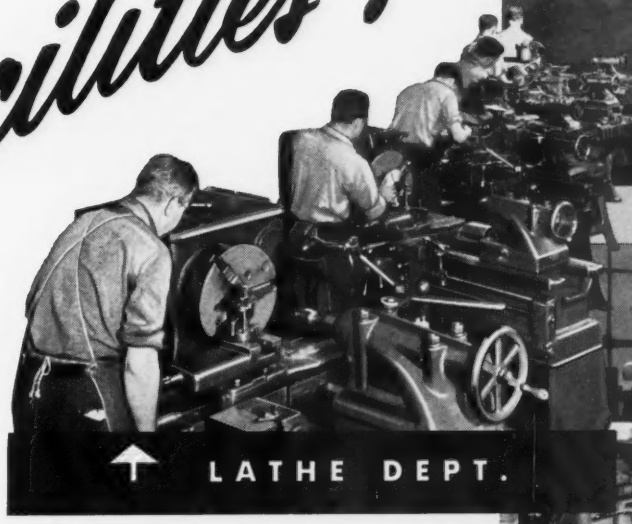

LATHE DEPT.

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...they're ready and able to serve you.

If you are looking for a reliable source for lathe work, milling and shaper work or non-ferrous castings (finish-machined or not) the chances are that City Pattern Foundry & Machine Company can fill the bill for you.

Each of these machining departments have a wide variety of modern equipment to handle almost any type of work that you might need. You'll find City Pattern Foundry and Machine Company an interested and economical source for both short and long runs.

In the foundry department you will find one of the most versatile and modern layouts in this part of the country. And, every conceivable laboratory control and testing device is on hand to insure chemical and physical specifications.

We will welcome the opportunity to give you more detailed information . . . won't you drop us a line or call in your specific requirements?

OUR NEW BROCHURE

Our colorful new brochure details our complete facilities for pattern work, foundry work and precision machining. Each department is completely illustrated with over forty recent illustrations. Your request will bring one to you promptly and without charge.

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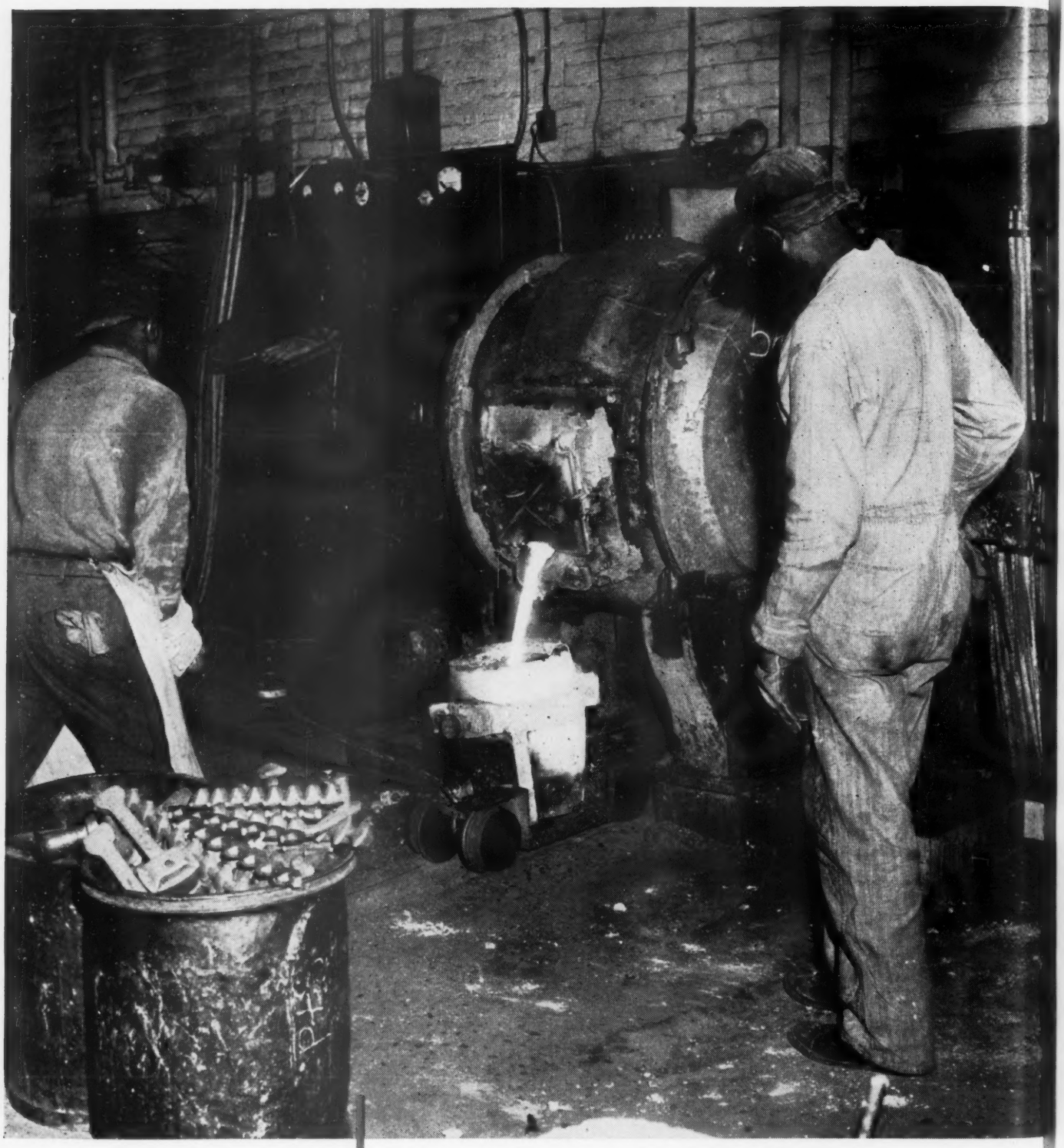


Typical Furnace Operating Data

Furnace type LFN, 500 lb., 150 KW rating

Total hours operation	7¼
Total number heats	5
Weight per heat	600 lbs.
Total metal melted	3000 lbs.
Total KWH used	965
Ave. KWH/ton	643
Ave. melt time/heat	54 min.

Refractory life and electrode consumption—(400-600 heats per lining and 8 lbs. per ton of iron melted.)

Ductile Iron Production

In Detroit ROCKING *Electric Furnaces*

Production of this useful, high strength alloy moves along with great efficiency and predictability at Penberthy Injector Company, Detroit. The alloy is prepared in Detroit Rocking Electric Furnaces, 600 lbs. to a heat, a ton and a half per furnace per shift.

Plant production of castings can be scheduled and carried out in an orderly, economical way. The Detroit furnace furnishes molten metal of the desired composition in a set time cycle.

A Versatile Furnace

The Detroit Rocking Electric Furnace, used here for ductile iron, is equally useful in melting other ferrous and non-ferrous metals.

The indirect arc used in these excellent furnaces minimizes carbon pick-up and resulting variations in metal composition. Positive control of temperature, optimum utilization of power are benefits, too.

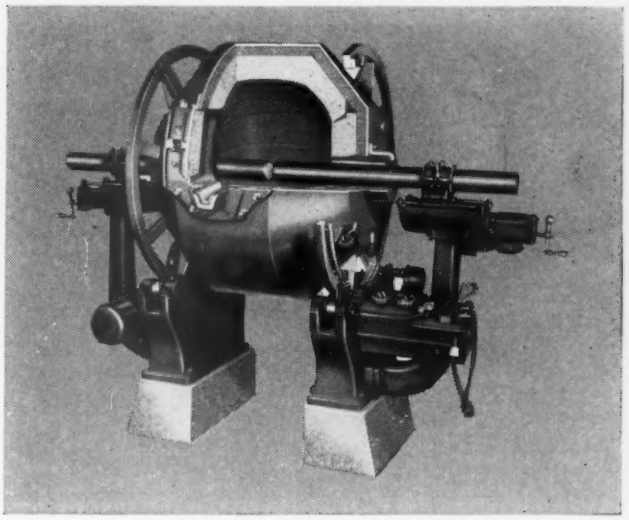
The controlled rocking action helps these furnaces operate with greater economy, since the molten metal washes over and picks up heat from a large area of the refractory. The motion of the metal assures complete homogeneity. Automatic controls, once set, duplicate the most favorable melting cycle time after time.

Get Full Information

With Detroit Rocking Electric Furnaces, you get less metal shrinkage, more usable metal per heat, more uniform product, longer refractory life, simple maintenance and exceptionally long service life.

Send us your operating data. Ask us to tell you how a Detroit furnace can do a better job for you.

Furnace capacities from 10 to 4000 pounds.



Cutaway view of the Detroit Rocking Electric Furnace, showing engineering and construction features. Rocking action assures maximum heat utilization.

DETROIT ELECTRIC FURNACE DIVISION

Kuhlman Electric Company • Bay City, Michigan

Foreign Representatives: in BRAZIL—Equipamentos Industrias, "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N. Y.; MEXICO: Cia Proveedora de Industrias, Atenas 32-13, Apartado 27A3, Mexico 6, D. F., Mexico; EUROPE, ENGLAND: Birlec, Ltd., Birmingham.

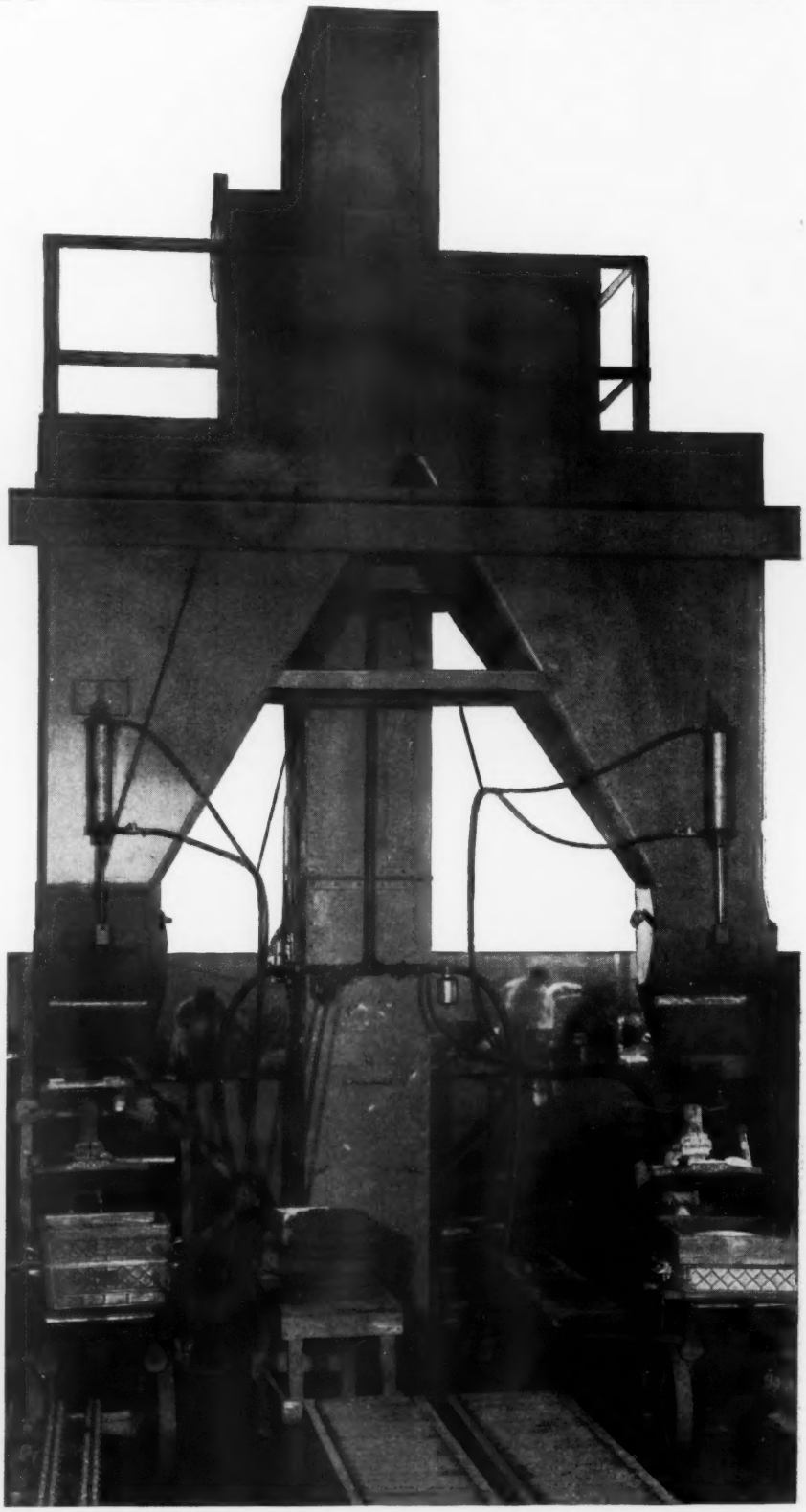
The SUPER HANDY SANDY

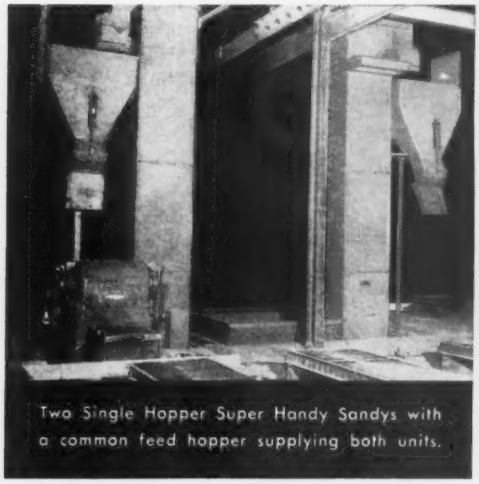
A HIGH CAPACITY INDIVIDUAL-FLOOR SAND HANDLING UNIT

fills large flasks in seconds—
that before took several man hours

This unit can handle up to 50 tons of sand per hour into overhead hoppers where it is available to the molders without effort. Super Handy Sandy's big sand capacity makes it ideally suited for use with large molding machines such as rollover machines, bumpers, and automatic molding machines.

The savings possible through use of the Super Handy Sandy are almost unbelievable. In one installation mold production on large molds has been increased 150% due to savings in shovel time alone. One molder can fill more molds than several men with shovels. He merely operates an air valve and the sand falls into the flask. Thus he spends more time making molds and less time getting ready.



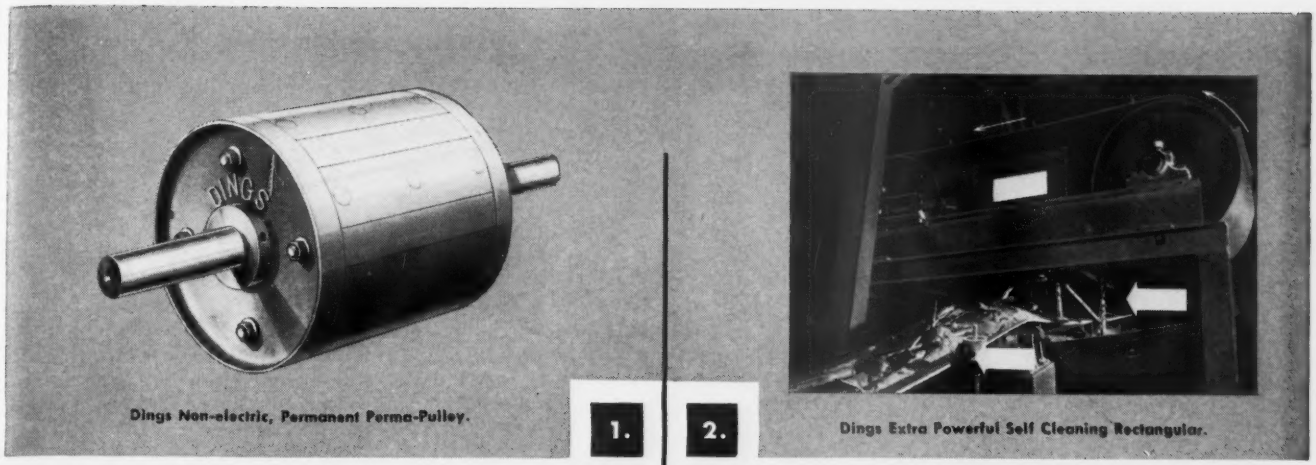


Two Single Hopper Super Handy Sandys with a common feed hopper supplying both units.

A copy of "Planned Mechanization for Foundries" is yours for the asking. Write, wire, or phone

NEWAYGO engineering company
NEWAYGO, MICHIGAN

Manufacturers of Neway® Mold Handling, Sand Handling and Conditioning Equipment



Dings Non-electric, Permanent Perma-Pulley.

1. 2. 3. 4.

Dings Extra Powerful Self Cleaning Rectangular.

Dings All-Welded Cooler Operating Lifting Magnet.

Dings "Holdtite" holds castings in position for swing grinding.

4 WAYS TO CUT HANDLING COSTS

Compare the advantages these Dings magnets offer over your present methods:

1. THE NON-ELECTRIC, PERMANENT PERMA-PULLEY in the sand handling system takes iron out automatically, without attention, without electricity, without maintenance. Perma-Pulleys have no operating expense, are guaranteed to be permanently magnetic. Magnetic strength is certified.

2. THE SELF CLEANING RECTANGULAR FOR THE TOUGHEST JOBS . . . *another sand handling cost-cutter.* Great power enables this magnet to handle particularly difficult iron extraction jobs. For *maximum* iron removal, none can surpass the Dings Rectangular. Self-cleaning feature makes operation automatic—eliminates "carry-over" of sand with iron.

3. LIFTING MAGNET LIFTS 10 TO 100% MORE. Ideal for handling scrap, pig iron, castings, metal flasks, etc. Lifts more because it's cooler operating. All welded, lightweight, moisture-proof, rugged, 4-point chain suspension.

4. "HOLD-TITE" CUTS GRINDING LABOR COSTS UP TO 25%. Firmly holds all shapes of castings up to 1000 lbs. in position for swing grinding. Magnet can be tilted to 7 different positions. Requires practically no maintenance, simple to install. SEND FOR THIS PAPER: *"Lowering Cleaning Room Costs Through Use of Magnetic Chucks".* Use coupon below.

If you can use the advantages these magnets offer, NOW is the time to act. Deliveries are still better than average.

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Dings: Send me Catalog containing full information on

☐ PERMA-PULLEY ☐ LIFTING MAGNET
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Article on "Lowering cleaning room costs through the use of magnetic chucks"

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Kaiser Aluminum is an integrated producer controlling every step of production from bauxite mining to the final pour.

We produce pig, ingot and billet to all standard specifications or to special customer specifications.

Our outstanding engineering service includes design assistance and other technical advice from our staff of skilled metallurgists. For prompt personal service, contact the Kaiser Aluminum sales office listed in your telephone directory.

Conveniently located plants at Newark, Ohio; Chalmette, Louisiana; Halethorpe, Maryland; Mead and Tacoma, Washington.

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The nation's largest supplier of pig, ingot and billet

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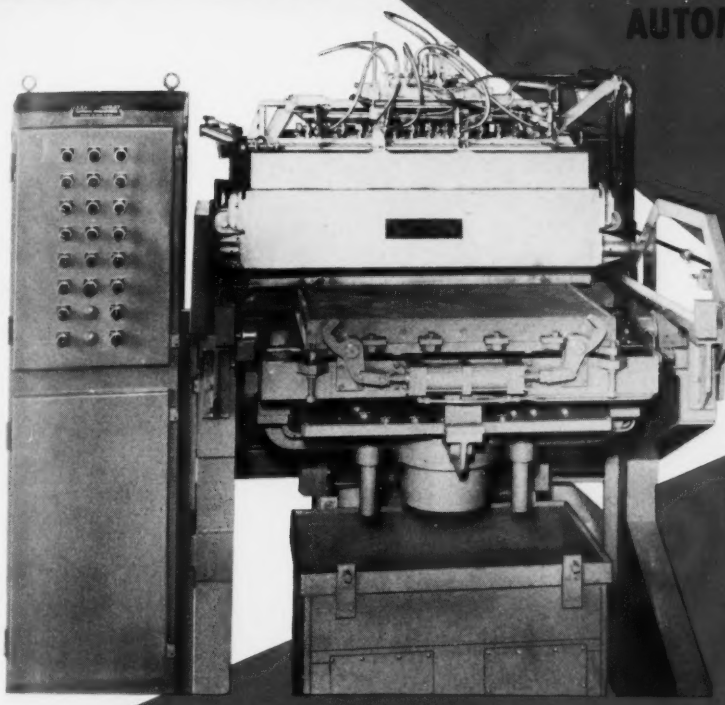
MEET PRODUCTION SCHEDULES ...LOWER PRODUCTION COSTS | AUTOMATICALLY

NEW, IMPROVED SUTTER SP-1100

AUTOMATIC SHELL MOLDING MACHINE



Maximum Mold Size—26" x 41" x 12" high. Pattern heated internally. Gas or Electrically Heated Oven.

featuring

new — *Larger, easily accessible resin bin*

new — *Completely electrically controlled*

new — *Faster, simpler adjustments for coating and curing time*

plus — *All the Sutter advantages that have been proven in foundries throughout the world*

Get your jobs out on time and save money doing it . . . a reality with the new, improved Sutter SP-1100.

Production is increased automatically because this machine automatically produces precision, high quality shell molds at an amazing rate of 40-50 cycles per hour. Production costs are reduced, too, because one unskilled operator can efficiently operate *two* Sutter Automatic Shell Molding Machines.

Knowing every job is different, Sutter has designed these machines with adjustable coating and curing times. You can quickly and easily select the proper time for most efficient operation . . . to maintain consistent high quality molds, regardless of the size or shape.

Too, every detail has been designed for economy. For example, pattern plates have integral stripper pins . . . reducing pattern costs, making it possible to change patterns faster. And, for short runs, you can utilize all of the pattern area by using Sutter quick change masks.

Naturally, only the finest materials are used in the careful construction of these units. You are sure of continuous day-after-day service . . . the same well-known Sutter dependability which has been proven in foundries all over the world.

Why not get all the facts? Send for your free Technical Bulletin No. 1100 today. It contains valuable information which shows how to meet foundry production schedules, how to lower costs—automatically.

Creators of foundry equipment with NEW productivity

SUTTER PRODUCTS COMPANY

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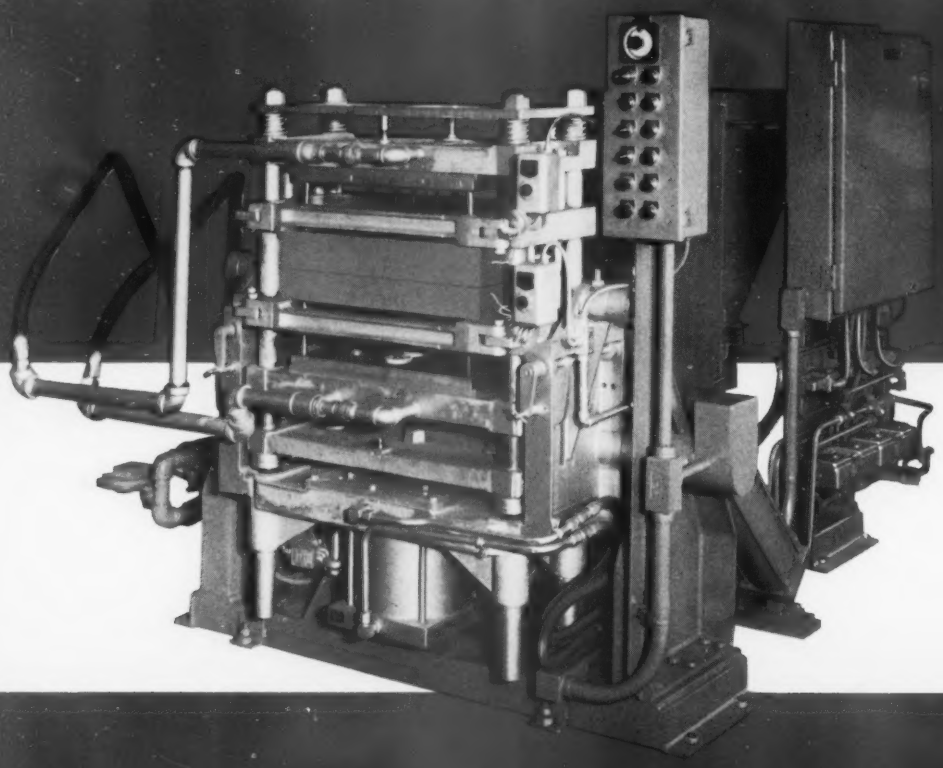
SUTTER

—New—
AUTOMATIC SHELL CORE BLOWER
Gives 50-90 Cycles per Hour



This machine uses heated, split core or mold boxes. Heat to each half is independently controlled. Each section contains stripper pins and plates. Operator's only function is to remove baked cores from the open section of the box.

SUTTER SP-1300

AUTOMATIC SHELL CORE AND SHELL MOLD BLOWING MACHINE

Maximum Box Size—
14" x 24" x 7"

Maximum Draw—3½"

Now, a completely automatic machine that produces smooth, precision shell cores and shell molds, fully cured, at the astounding rate of 50-90 cycles per hour . . . the new Sutter SP-1300. Ample size of this unit permits the use of large, multiple cavity boxes for blowing both solid and hollow cores.

With this machine costly core ovens and driers are eliminated, as are the operating costs of this space-taking equipment . . . there is no rehandling, less breakage . . . and the saving in man-hours is enormous. All of which adds up to more and better cores produced in less time at lower costs on the Sutter SP-1300.

Although only cores have been mentioned, the same advantages apply to shell mold blowing. This versatile, dual-purpose machine was designed to efficiently produce both.

If you want to know all the "whys and wherefores" of this process and equipment, drop us a line and ask for your free technical bulletin No. SP-1300.

DO-40M-455

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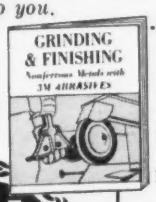
3M METHOD—better from start to finish

New Jersey foundry increases production 66% with 3M Abrasive Belts

3M Abrasive Belts *are long-lasting production tools, designed to do the best grinding and finishing job at lowest cost to you.*

J. Rohm & Sons Co., Kenilworth, N.J., obtained this production increase when they switched to the 3M Abrasive Belt Method for removing excess gate and riser stock from this tough, bronze casting. This company formerly used hard wheels, grinding only 30 castings per hour. When the 3M Method was installed, using Three-M-ite Resin Bond Cloth Belts, production jumped to 50 units per hour with lower unit costs, less operator fatigue, and greater safety. 3M Abrasive Belts can help you increase production, too. Your 3M Representative is an abrasives expert who can show you how the 3M Abrasive Belt Method can work best in your foundry. Send coupon today for facts.

Write Today for FREE Booklet!



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3M ABRASIVES

from the world's largest coated abrasives machine

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☐ *Send me free booklet on grinding of non-ferrous metals.*
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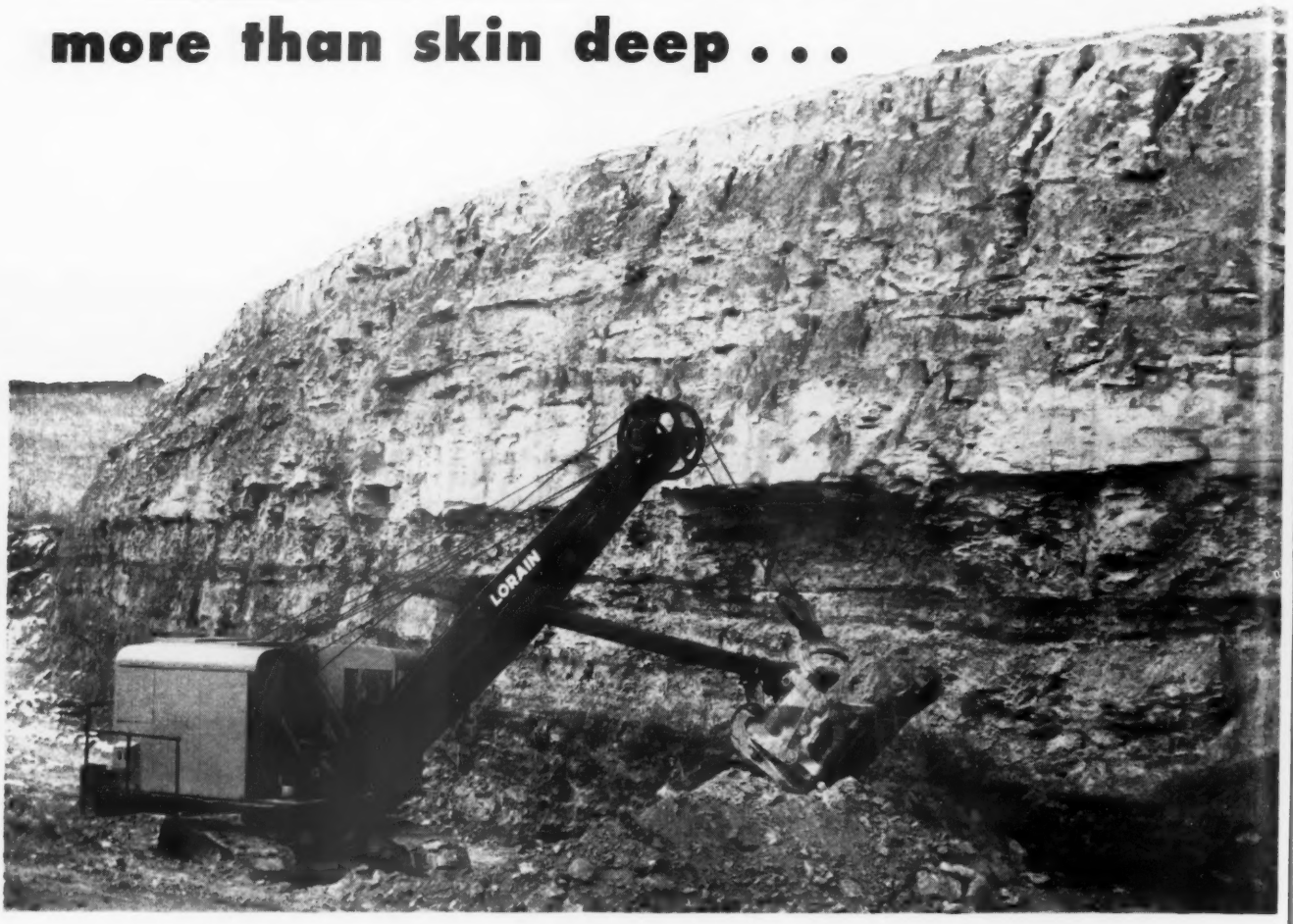
Cedar Heights Clay quality— more than skin deep . . .



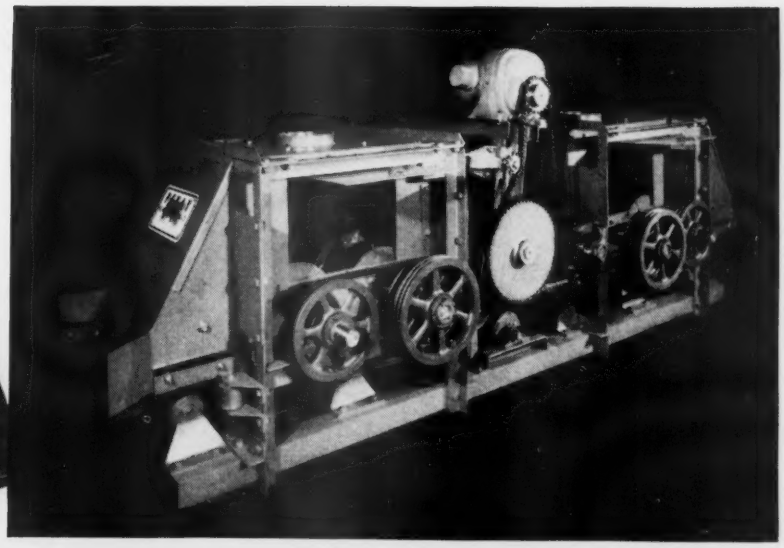
only the finest clay is mined . . . then quality controlled all the way to your mix

We don't just scratch the surface to mine our clay . . . we really dig deep! A mountain of strata is exposed, tons of waste dirt and rock cut away, before clay with the proper plastic qualities is reached.

After mining, every step in the refinement of Cedar Heights Clay is carefully quality-controlled to insure elimination of impurities and to maintain plasticity and high refractory value. Always specify Cedar Heights Clay from your nearest distributor.

CEDAR HEIGHTS CLAY COMPANY

50 PORTSMOUTH ROAD
OAK HILL, OHIO

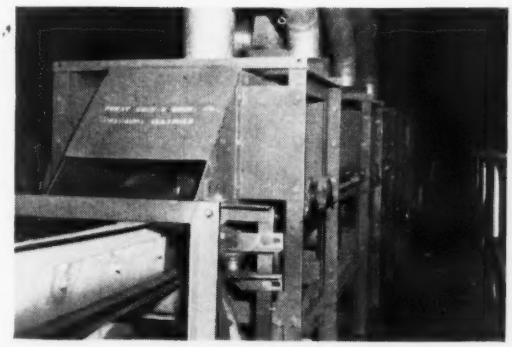


Mixer-Muller
for better sand conditioning

PUT RIGHT INTO YOUR PRESENT CONVEYOR SYSTEM, GIVES YOU UP TO 230 TONS PER HOUR ...and it's better sand!

A. CUTTER WHEELS are designed for positive elimination of lumps—give even distribution, provide consistent free-flow characteristics.

B. MULLER WHEELS put sand (belt-conveyed from cutters) in perfect condition for molds. Capacity can be increased as needed.



Multiple-unit installations are easy to make —can handle any desired volume of sand.

Day in and day out, foundries are getting up to 85% more sand volume with their PEKAY *Mixer-Mullers*—and at the same time, cutting operating costs sharply! Skilfully designed cutter wheels assure free-flowing sand, with lumps eliminated and with sand temperature reduced; and proper mulling continuously delivers sand in perfect condition for molds, which means a big cut in scrap losses. What's more, the amount of bonding clay and Bentonite which must be added drops sharply.

Other profits show up quickly, too, because power costs are reduced, and because maintenance costs are so much less with this easy-to-inspect, easy-to-service unit. The Mixer-Muller is strongly built but compact—the single unit is approximately 10 feet long, 2 feet high, width according to your belt. Multiple-stage units are also available.

Yet with all these advantages, PEKAY *Mixer-Mullers* cost you less to buy—and less to install. In fact, installation usually takes only about 100 man-hours of labor. No wonder more and more foundries of all types and sizes are installing these efficient units!

★ ***Dimensional drawings and other data are given on the back of this page.***

SPECIALISTS IN FOUNDRY SAND-HANDLING ENGINEERING & EQUIPMENT

M-T-MATIC ELEVATOR CONVEYOR BUCKETS
TROFF-O-MATIC CONVEYORS

PEKAY MACHINE & ENGINEERING CO.

871 N. SANGAMON STREET CHICAGO 22, ILLINOIS

Save furnace time with...
"ELECTROMET" SILICOMANGANESE

TRADE-MARK

ELECTROMET silicomanganese is an excellent deoxidizer for cleansing steel quickly and thoroughly. This combination alloy contains two active ingredients in the correct proportion for rapid deoxidation of the furnace bath. Because of the low carbon content of the alloy, the carbon in the bath need not be reduced so much as would otherwise be necessary.

This combination of rapid deoxidation and low carbon content can save as much as 20 minutes per melt in the production of open hearth steels. Furthermore, it provides close control of final analysis when blocking the heat. ELECTROMET silicomanganese is also well suited for additions to the ladle to adjust final specifications, particularly for engineering steels.

ELECTROMET silicomanganese contains 65 to 68 per cent manganese, and is produced in maximum 1.50, 2.00, and 3.00 per cent carbon grades (containing 18 to 20 per cent, 15 to 17.50 per cent, and 12 to 14.50 per cent silicon, respectively). ELECTROMET's metallurgists, with years of practical experience in steel making, will be glad to help you with the use of silicomanganese, or any ELECTROMET products. Write or phone the nearest ELECTROMET office for further information or ask to have one of our metallurgists call. There is no cost or obligation for this service.

The term "Electromet" is a registered trade-mark of Union Carbide and Carbon Corporation.

ELECTRO METALLURGICAL COMPANY

A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

OFFICES: Birmingham • Chicago • Cleveland • Detroit
Houston • Los Angeles • New York • Pittsburgh • San Francisco

In Canada: Electro Metallurgical Company, Division of Union Carbide Canada Limited, Welland, Ontario

Electromet

TRADE-MARK

Ferro-Alloys and Metals

fine FANNER CHILL COILS

YOUR BEST DEFENSE *against unsound castings*

● Castings with different size sections need "relief from the heat" in the larger sections to equalize cooling rate throughout—to prevent sponginess, checks and cracks due to uneven shrinkage.

Fine Fanner Chill Coils, because of their wide range of sizes, shapes and metals, enable you to solve cooling problems where large masses of metal are not involved . . . prevent rejects and get sounder castings than ever before. Illustrated are a few fine Fanner Chill Coils used by leading foundries. Gauges, diameters, coil and tail length can be varied to suit any job.

wrong

Showing how metal has kicked away from ordinary nail head used in light casting section.

right

Showing a perfectly solid casting with fine Fanner Chill Coils.

Write for complete catalog of fine Fanner Chills today.

THE FANNER MANUFACTURING COMPANY

designers and manufacturers of FINE FANNER CHAPLETS AND CHILLS

BROOKSIDE PARK CLEVELAND 5, OHIO

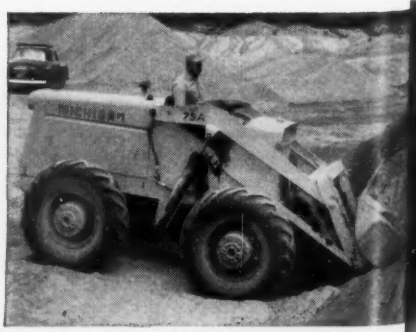
In Canada: CANADIAN FANNER, LTD. • Hamilton, Ontario

The bonus in the bucket

Watch this demonstration of the MICHIGAN Bonus

1. 300% Torque Multiplication
Watch the powerful crowding action —forcing the bucket into the pile. The Clark Torque Converter provides that smooth, shockless power—as resistance increases, you get more torque automatically—*up to 300 per cent.*

2. Terrific Break-Out Power
Get the bucket-blade into hard-to-dig material, or under a heavy obstacle, and loosen it by "working the bucket" —the two double-acting hydraulic cylinders are actually powerful enough to pull the back wheels off the ground.



3. Low Level Bucket Action
At a height of only 3 feet, you can tip the bucket back with a full load. Low-level bucket action is independent of boom hoist. You can travel a full load at low-level—with excellent visibility and stability, and you *won't* spill the load.

t pays for this machine fast!

Capacity is strictly a matter of how much you can pick up in the bucket — NOT how much is printed on a specification sheet.

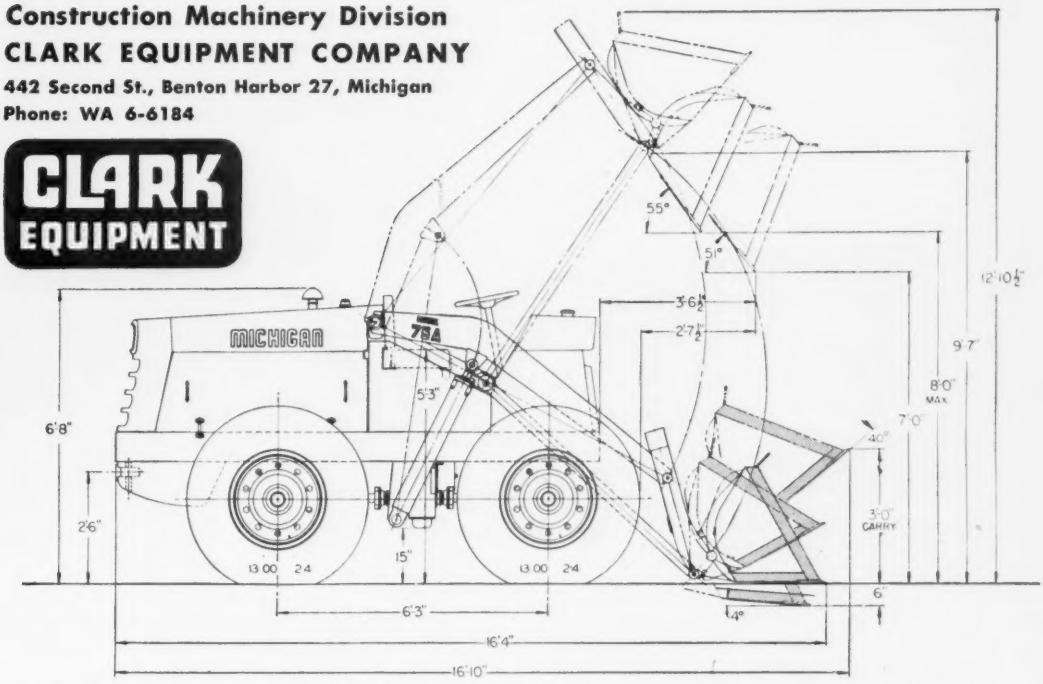
Take a close look at the bucket in the photograph. It shows a typical MICHIGAN bucket load, heaped-up well over the 1-yard *rated capacity* of this Model 75A. There's nearly a 100% bonus in the bucket—and that's a major reason why a MICHIGAN pays for itself fast.

You simply move more with a MICHIGAN! With its powerful independent bucket action, you can *dig* your way into a pile of tough material. Low-level bucket tip-back enables you to get a full bucket-load even when the pile is only a few inches high. With a MICHIGAN, you come up with a bonus in every bucket — bonus tonnage that pays for this machine *fast.*

Two outstanding features combine to give you bonus yardage on a MICHIGAN. The Clark-built power train, with torque converter and power-shift transmission, gives you more cycles per hour; MICHIGAN bucket action puts more material in each bucket load. For a demonstration, on your own job, if you wish, call your local MICHIGAN distributor, or write or call us direct. And ask for details on the low cost MICHIGAN Lease Plan.

Construction Machinery Division
CLARK EQUIPMENT COMPANY
442 Second St., Benton Harbor 27, Michigan
Phone: WA 6-6184

CLARK EQUIPMENT



Multi-position Bucket Action: note the shaded area of this Model 75A range chart. From 6 inches below ground-level, two big double-acting bucket cylinders pull the bucket back to a 40-degree carrying position at a height of only 3 feet. The operator has precision control over this independent bucket action.

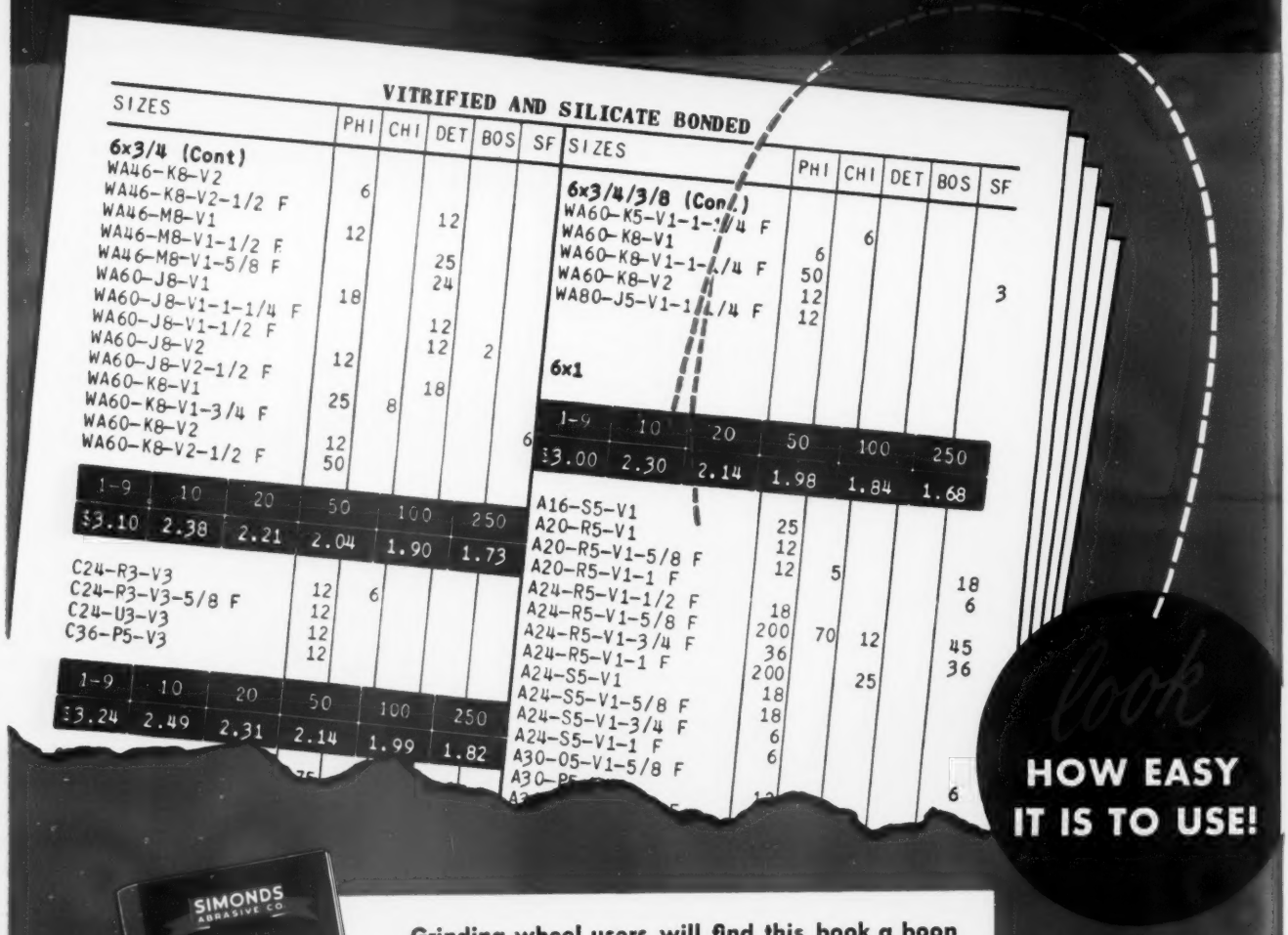
s Bucket

4. Full Power at the Bucket
Step on the brake and automatically put the transmission in neutral—the full hydraulic power goes into the bucket cylinders. Accelerate for faster bucket action and this automatic neutral takes the load off the brakes and torque converter.

5. Look—No Clutch!
Watch the driver *change direction while moving*—by flipping the easy hand-lever on the steering column. There's no clutch pedal on a MICHIGAN—the torque converter and power-shift transmission takes all the work out of gear-shifting.

6. Easy to Drive
Operate the boom and bucket controls with the right hand and spin the steering wheel effortlessly with the left—hydraulic power does the muscle work.

Now.. for your convenience consumer *net prices* for SIMONDS grinding wheels



look

HOW EASY IT IS TO USE!

Grinding wheel users will find this book a boon to the problems of grinding wheel pricing and delivery. Here, shown together for the first time, is complete availability of all the stock items of Simonds Grinding Wheels and *Consumer Net Price* per wheel in every ordering quantity.

SEND FOR YOUR COPY

SIMONDS ABRASIVE COMPANY • PHILADELPHIA 37, PA.

Branch Warehouses: Boston, Detroit, Chicago, Portland, San Francisco • Distributors in Principal Cities
Division of Simonds Saw and Steel Co., Fitchburg, Mass. • Other Simonds Companies: Simonds Steel Mills, Lockport, N.Y.
Simonds Canada Saw Co., Ltd., Montreal, Quebec, Lion Grinding Wheels Div., Brockville, Ont. and
Simonds Canada Abrasive Co., Ltd., Arvida, Quebec

COSTS WAY DOWN—QUALITY WAY UP

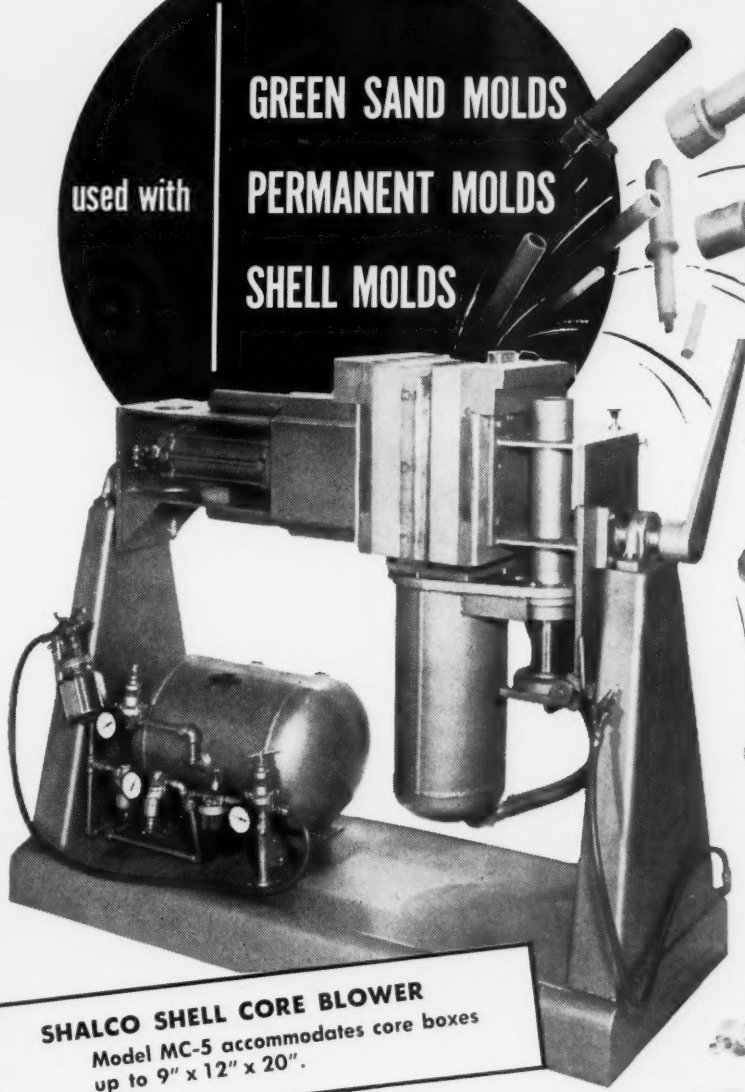
with smooth, precise, collapsible HOLLOW CORES

used with

GREEN SAND MOLDS

PERMANENT MOLDS

SHELL MOLDS



SHALCO SHELL CORE BLOWER
Model MC-5 accommodates core boxes up to 9" x 12" x 20".

Producing finished cores, ready for setting, in 30 to 50 seconds, Shalco Shell Core Blowers reduce core production costs up to 80%. Core dryers and ovens are eliminated. Excellent burn-out and easy collapsibility of these hollow shell cores cut cleanup time to the bone. Uniform venting and precision finish provide smooth interior surfaces cast to close tolerance. For the shell core blower that's foundry-proved coast to coast, get full details on Shalco!

SHALLWAY CORPORATION
Connellsville, Pa.

SHALCO ENGINEERING CORPORATION
Palo Alto, Calif.

SHALCO, Connellsville, Pa.

Gentlemen:

☐ Please put me on your mailing list for your *Shal-Tec Bulletin*, summarizing latest shell core and mold techniques and developments.

☐ Please have your representative contact me.

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____

STRATEGIC LOCATIONS

of Semet-Solvay's Coke Plants and Coal Mines

1 2 3 . . .

SECURITY OF SUPPLY

Semet-Solvay Division is the only merchant coke producer with four coke plants. Our 701 coke ovens . . . research laboratory . . . our new, tremendous rated capacity of 3,750,000 tons of coke a year means that you can depend on Semet-Solvay for *all* the foundry coke you need.

BETTER SERVICE

You can't beat the dependable service readily available from a Company which not only has a plant near you, but also has plants on the edge of the best by-product coal field in the world. Look at the map on the opposite page . . . See why Semet-Solvay can serve 82% of the gray iron foundries in the U. S. and Canada conveniently and economically from one or more of its plants. Strategic locations does it!

BETTER COKE

Semet-Solvay Foundry Coke is famous for its closely controlled quality . . . for, from the selection and cleaning of special coking coals from our own mines to the screening and loading of high-quality, uniformly sized foundry coke, every operation is under strict Semet-Solvay control.

FREE METALLURGICAL SERVICE

Trouble or variable results in a foundry can very often be quickly diagnosed by an outside consultant. That's why Semet-Solvay has a staff of experienced foundry metallurgists. These men are practical foundrymen, and they are at your service — without obligation — for just a call to our nearest sales office.

BUFFALO
602 Genesee Building
Buffalo 2, New York

CINCINNATI
723 Dixie Terminal Building
Cincinnati 2, Ohio

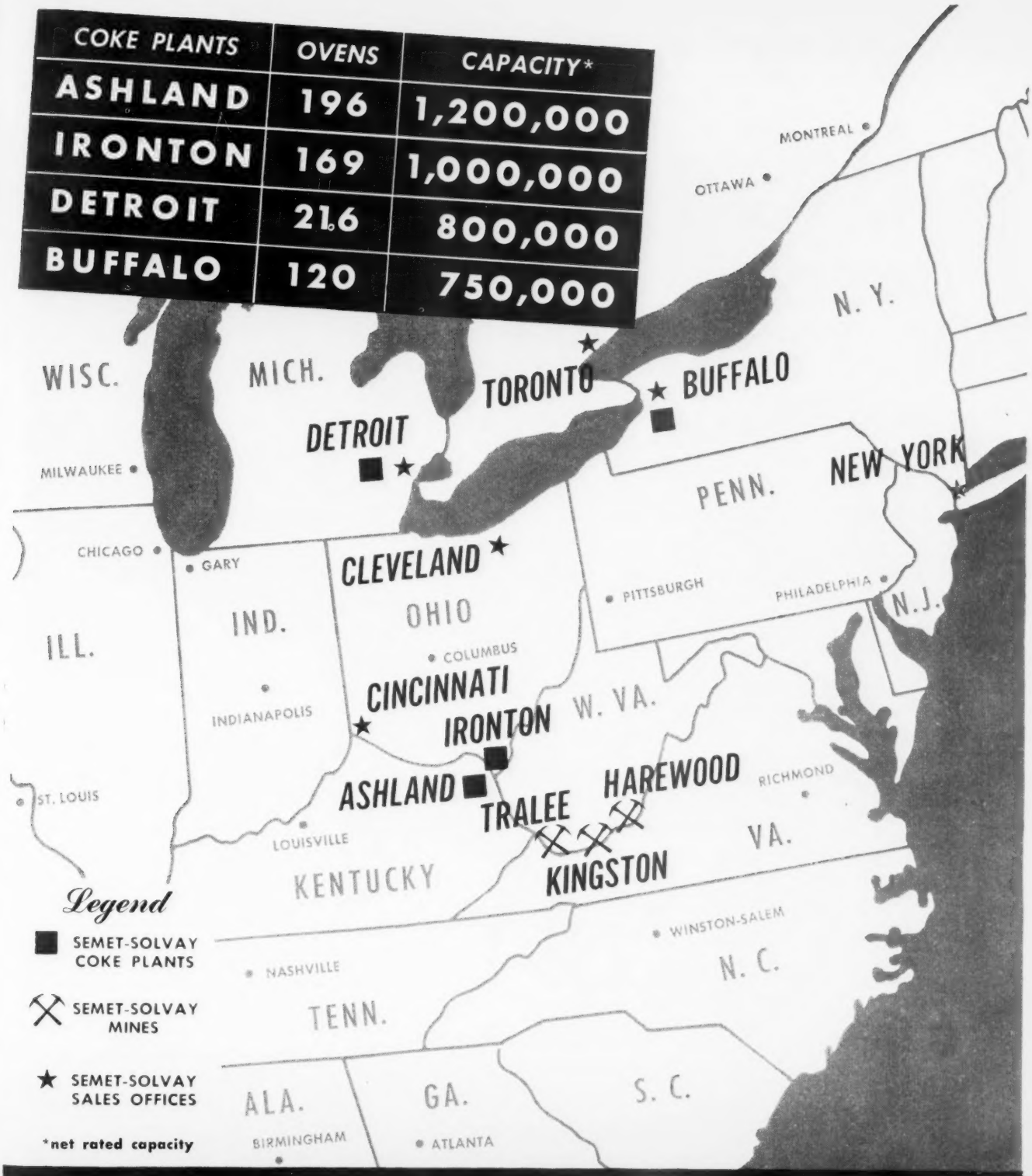
CLEVELAND
2405 Terminal Tower Building
Cleveland 13, Ohio

DETROIT
2532 Buhl Building
Detroit 26, Michigan

TORONTO
1317 Canadian Bank of Commerce Building
Toronto 1, Ontario, Canada

A Better America Through Chemical Progress

CHEMICAL PROGRESS WEEK-MAY 16-21



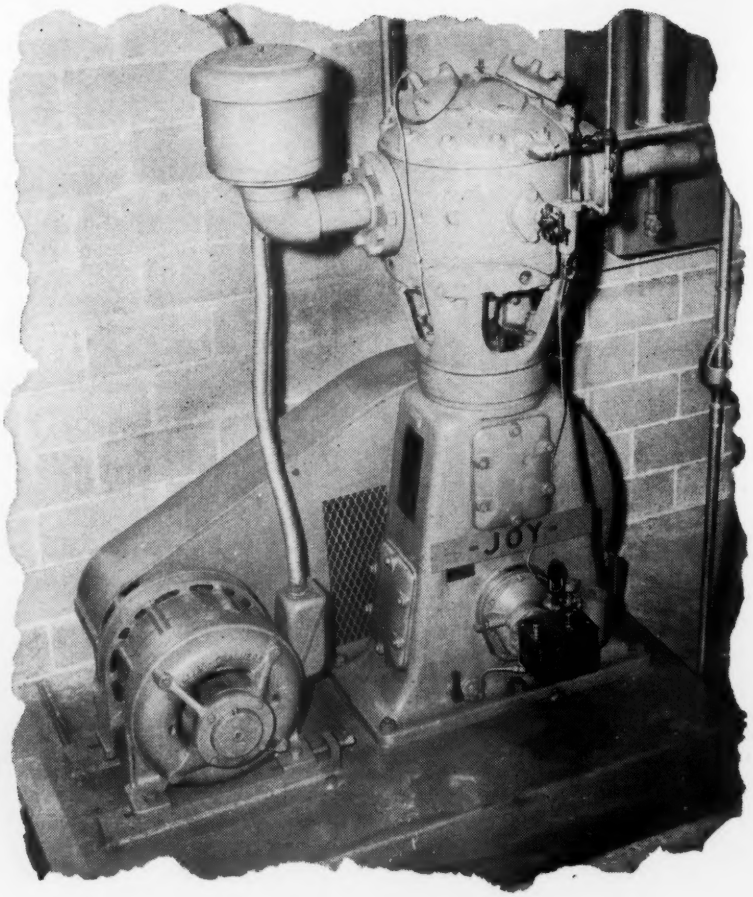
SEMET-SOLVAY DIVISION

Allied Chemical

YOU GET BIG COMPRESSOR ADVANTAGES...

UNEQUALLED DURABILITY!

TRULY CONTINUOUS SERVICE!



...in this SMALL HEAVY DUTY JOY WG-9

The Joy WG-9 was designed to give a moderate (up to 881 CFM) but *continuous* air supply. It is suited for use both as a main air supply for smaller requirements, and as an auxiliary, or decentralized, air source in larger plants.

Heavy duty service is assured through these many "big compressor" advantages, including exclusive features not found in any other units available for comparable service:

- Water cooled for continuous operation, greatest efficiency.
- *Exclusive* . . . replaceable-on-the-job cylinder liners for easy maintenance.
- Heavy duty, ball-type main bearings which need no adjustment.
- *Exclusive* . . . field-replaceable crosshead guide of special alloy, honed to mirror finish.
- Patented "Dual Cushion" valves for efficient, lasting life and quiet action.
- Full force-feed lubrication to all working parts.
- Rugged construction throughout for long life, low maintenance.
- Single-stage, double-acting . . . vertical design for greater economy of floor space.

Joy WG-9 Heavy Duty Compressors are available in fifteen different capacities and with a wide range of pressures from 30 lbs. up. Write for bulletins on standard, booster or oil-free models, to ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario*

W&D I-5504

Consult a Joy Engineer

FOR VANEAXIAL FANS • COMPRESSORS
VACUUM PUMPS AND BOOSTERS • OXYGEN GENERATORS

JOY

SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

Now . . . 7 big improvements for foundrymen
from HANNA . . . the best known name in iron . . .

HANNATEN

THE IRON INGOT WITH THE NEW SHAPE

For users of 10-lb. pigs

AVAILABLE IN ALL GRADES AND EXTRA-CLOSE-GRAIN HANNATITE. (STANDARD 38-POUND PIGS ALSO AVAILABLE.)

THE HANNA FURNACE CORPORATION

Buffalo • Detroit • New York • Philadelphia

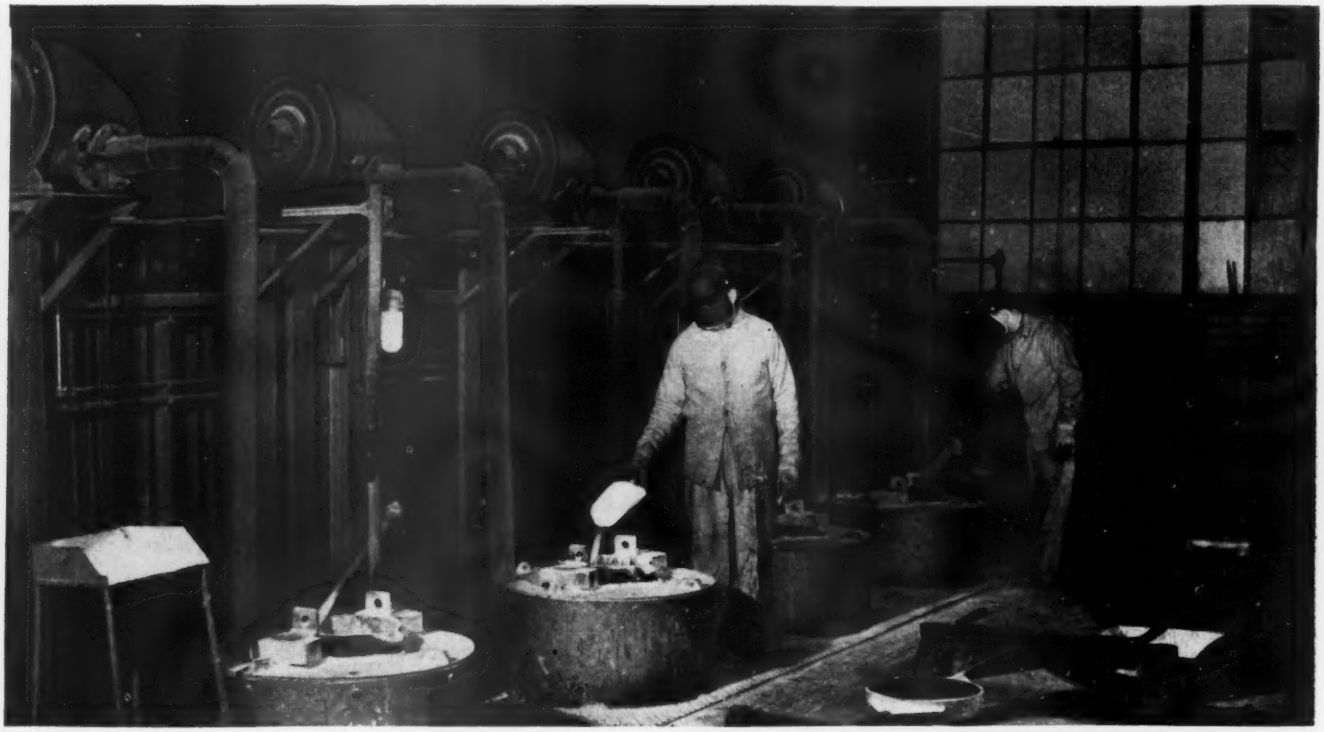
Merchant Pig Iron Division of

NATIONAL STEEL CORPORATION

Nonferrous Melting with . . .

TURBO-COMPRESSORS

There are many methods of melting non-ferrous metals but the accepted standard for furnishing air to Oil and Gas fired furnaces is the Spencer Turbo-Compressor. A battery of Spencer 5 HP turbos in the foundry of a large Chemical plant is shown below.



Thirty-five years ago the Spencer Turbo was first specified by a furnace manufacturer. Today it is the first choice of all of the leading furnace and oven manufacturers.

The reasons they prefer Spencer are the absolute reliability—perfect performance and low maintenance over long years of almost continuous service. Spencer Turbos range in size from 35 to 20,000 cu. ft. per min., 4 oz. to 10 lbs. and 1/3 to 1,000 HP.

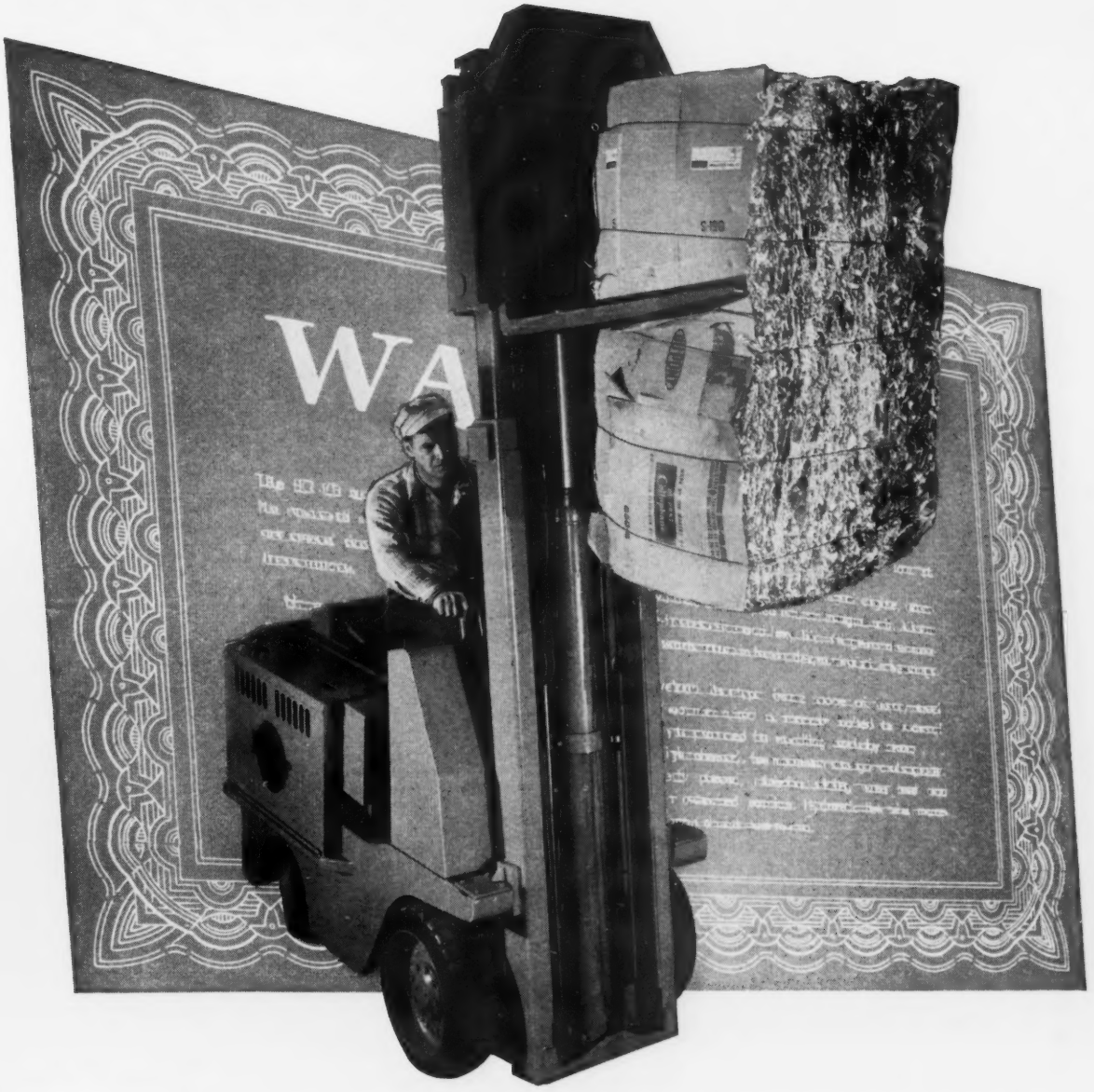
For complete description of the standard and special Turbos ask for Bulletin No. 126-A.

THE SPENCER TURBINE COMPANY

HARTFORD 6
CONNECTICUT

494-N

Manufacturers of Turbo-Compressors and Heavy Duty Vacuum Cleaners



Insist on a...

ONE YEAR WARRANTY

when you buy an electric fork truck

All Baker battery-powered industrial trucks—including fork, platform, crane trucks and tractors—are warranted against defects for a full year from date of shipment.

As a truck purchaser, you should accept nothing less.

A one-year warranty assures you that the manufacturer has complete confidence in the materials and workmanship that go into his product. It gives you twelve months protected operation of the truck *under your conditions*—allowing ample time to detect imperfections, which might not show up during a 30, 60 or 90 day guarantee period.

Baker Trucks have a half-century reputation for outstanding performance, long life and low maintenance. For example: a fleet of the first Baker ram trucks ever built is still in service at a large midwestern steel mill after 32 years!

Let a Baker handling engineer give you the full story, or write for Bulletin 54B. The Baker-Raulang Company, 1223 West 80th Street, Cleveland 2, Ohio.

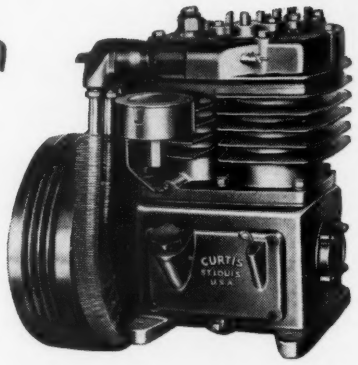
Baker.
handling equipment

5E2

Curtis

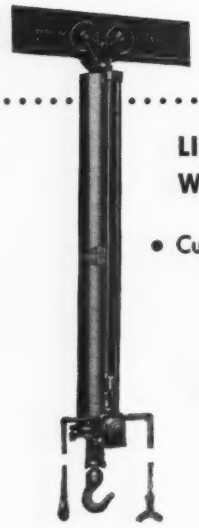
AIR COMPRESSORS, HOISTS and CYLINDERS

Cut Costs While Speeding Production



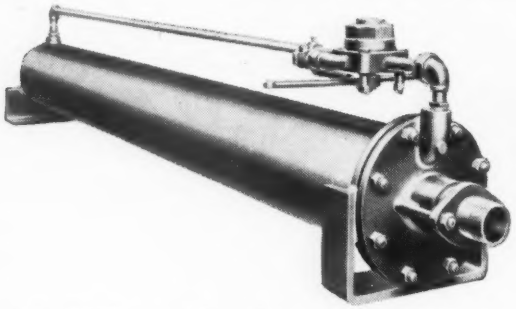
AIR TO DO INNUMERABLE JOBS AT LOWER COST WITH A PRECISION-BUILT CURTIS COMPRESSOR

- Timken roller main bearings equipped—easy external adjustment.
- Self-oiling—pressure lubricated rod bearings and piston pins.
- Air-cooled—no danger of freeze-ups.
- Tank Mounted Compressors ¼ H.P. through 15 H.P. (up to 78 cu. ft. displacement per minute)
  Simple Compressors ¼ H.P. through 50 H.P. (up to 300 cu. ft. displacement per minute).



LIFT OR LOWER LOADS QUICKLY WITH A CURTIS "ALL STEEL" AIR HOIST

- Cut costs with these time-saving, work-saving air-powered hoists.



PUSH IT, PULL IT, LIFT IT, LOWER IT WITH A CURTIS "ALL STEEL" AIR CYLINDER

- Curtis Bracketed Air Cylinders can work in any position from horizontal to vertical.
- Delicate control of lifting and lowering speeds.
- Cylinders ground and polished on inside diameter.
- They bring new time-saving ease where lifting, lowering, pulling or pushing is required.
- Valve is disc type. Returns automatically to neutral position when operating chains are released . . . and effectively hold the load.

Get all the facts about cost-cutting Curtis equipment!

1854 **101** 1955
years

Curtis PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
1922 Kienlen Avenue • St. Louis 20, Mo.

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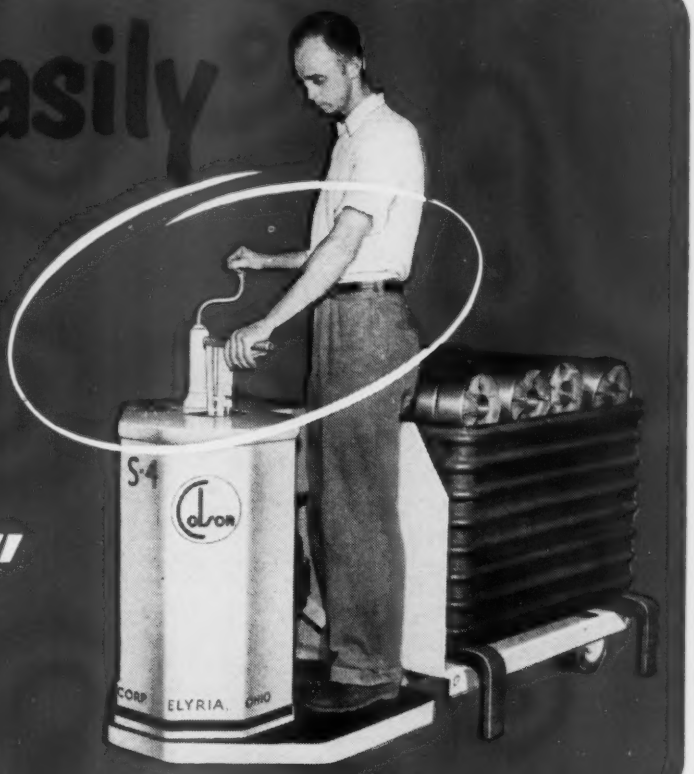
Look How Easily

The Colson® "HANDLER"

Handles Loads up to 4000 pounds



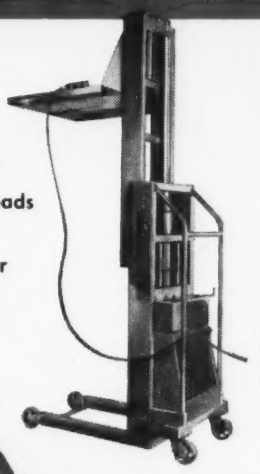
Just one lever does it all...*SHIFTS, LIFTS, BRAKES!*

The "Handler" is the first proved-in-service gasoline powered Lift Truck with hydraulic drive and hydraulic control. Just one lever does all the work — selects; speed range (low or high), direction (forward or reverse), load movement (raise or lower), and brakes (return to neutral applies brakes). Rider has unimpaired visibility at all times — backwards or forwards — and "dead-man" brakes are an important extra safety factor. Six horsepower gasoline engine provides plenty of power for rugged, round-the-clock operation.

Other Cost-Saving Colson Materials-Handling Products

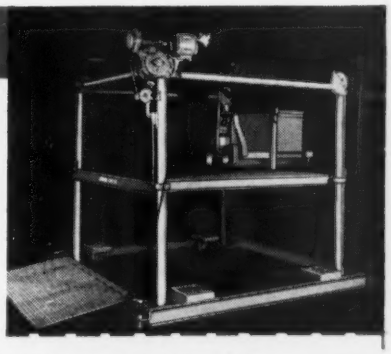
The Lifter

Makes quick, easy work of transporting and stacking loads Available in single and telescopic models — hand or power operated. Capacities from 150 to 3000 pounds.



The Leveler

Industry's leading device for handling loads between levels. May be portable or permanently installed. Capacity 6000 pounds.



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THE Colson® CORPORATION
ELYRIA, OHIO

CASTERS AND INDUSTRIAL MATERIALS-HANDLING PRODUCTS

The Colson Corporation • Elyria, Ohio

Please send free literature on:

The Handler ☐
The Leveler ☐
The Lifter ☐
} please check

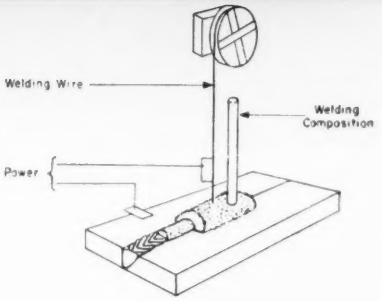
NAME _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE ____ STATE _____

UNIONMELT Welding Solves "Impossible" Casting Job . . .



UNIONMELT welding solved the problem when a manufacturer was unable to make one-piece castings of compressor cylinders used in gas line pumping stations—other welding methods proved too slow and costly . . . UNIONMELT welding cuts 40 hours in production time, and produces high-quality welds that easily withstand pressure of 750 lb. per sq. inch.

The 42-in. diameter cylinder is cast in two halves, and has an internal piston bore with surrounding suction and exhaust chambers . . . The 2½-in. thick piston walls and 3-in. thick outer walls of each half are aligned and UNIONMELT welded.

Like many other products throughout industry, these cylinders are being fabricated faster and more economically than ever before, because UNIONMELT welding offers:

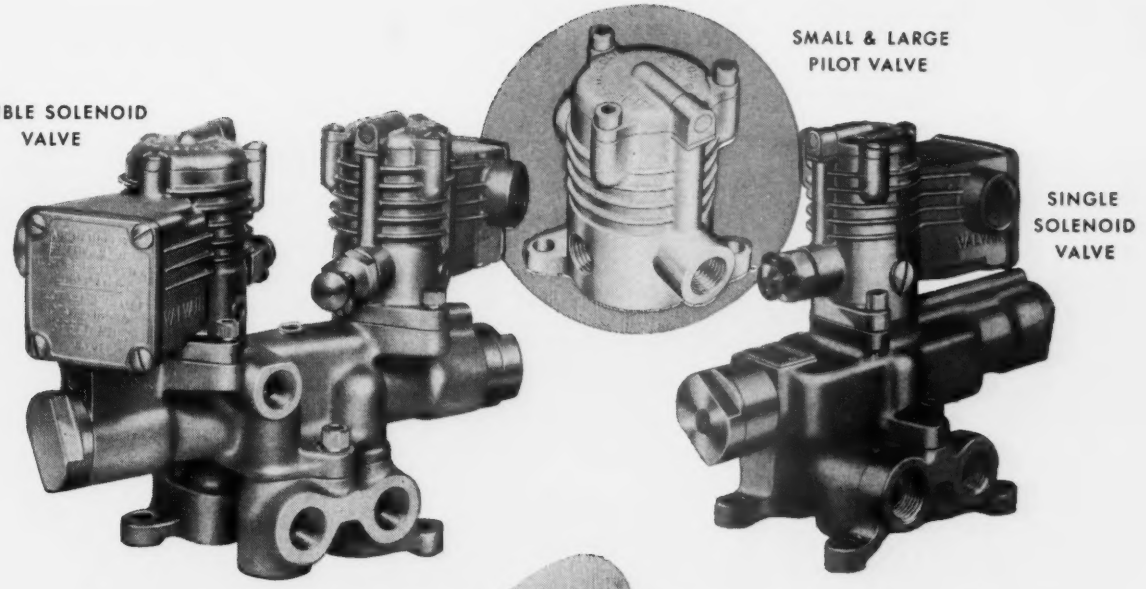
- Higher welding currents than other welding processes . . . Up to 4,000 amperes . . . Joins metal of any thickness.
- Greater economy—½ to ⅔ less welding wire . . . Also uses larger-diameter, less-expensive wire.
- Use of any power supply—a.c., d.c., or constant potential . . . With c.p., no control is necessary to maintain constant arc voltage—welding is fast and more easily controlled.

Start saving now—call your local LINDE representative for more information and ask for Form 7942, "Modern Methods of Joining Metals."

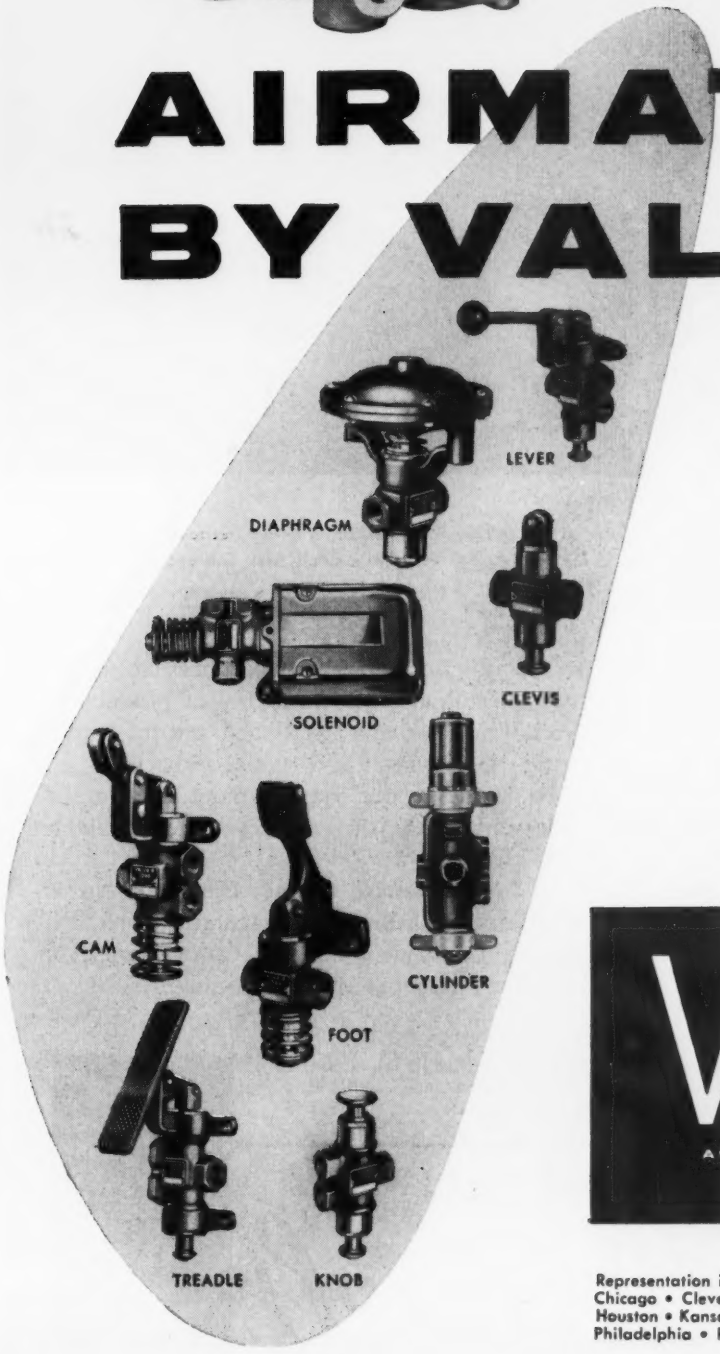
Linde Air Products Company
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
Offices in Other Principal Cities
In Canada: DOMINION OXYGEN COMPANY
Division of Union Carbide Canada Limited, Toronto

The terms "Linde" and "Unionmelt" are registered trade-marks of Union Carbide and Carbon Corporation.

Linde
Trade-Mark



AIRMATION BY VALVAIR



AIRMATION by VALVAIR — a control of components for Automation in air, vacuum and hydraulics.

SINGLE OR DOUBLE SOLENOID VALVES, LARGE OR SMALL PILOT VALVES — Designed and built to J. I. C. Standards. Maximum Speed — Life — Range — Durability.

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"We're melting everything under the sun

with our

LECTROMELT* FURNACE"

says:

M. C. Stephens, Jr., Melting Supervisor
Ross-Meehan Foundries
Chattanooga, Tenn.

This size P. T. furnace rated at 3½ tons per hour is the larger of two Lectromelts which are contributing to the versatility of Ross-Meehan Foundries' operation.

"We're a job foundry.
It's good business to be so versatile."

". . . Out of 11 heats turned out in 17 hours of one day, eight were of different alloys. Every day we produce three to five different metals as standard procedure, including Ni-Resist, 28 chrome and Meehanite. And the ease of making a special heat of steel in a Lectromelt* Furnace helps us a lot. It seems that everything about a Lectromelt is just right for our production."

This production man is talking about his foundry job. He has seen the value of precise control of temperature and analysis made possible with a Lectromelt Furnace. The flexibility of production, the versatile nature of a Lectromelt and the matter of casting special heats and special alloys daily . . . these could make your foundry more efficient and capable—could let you go after more profitable castings business.

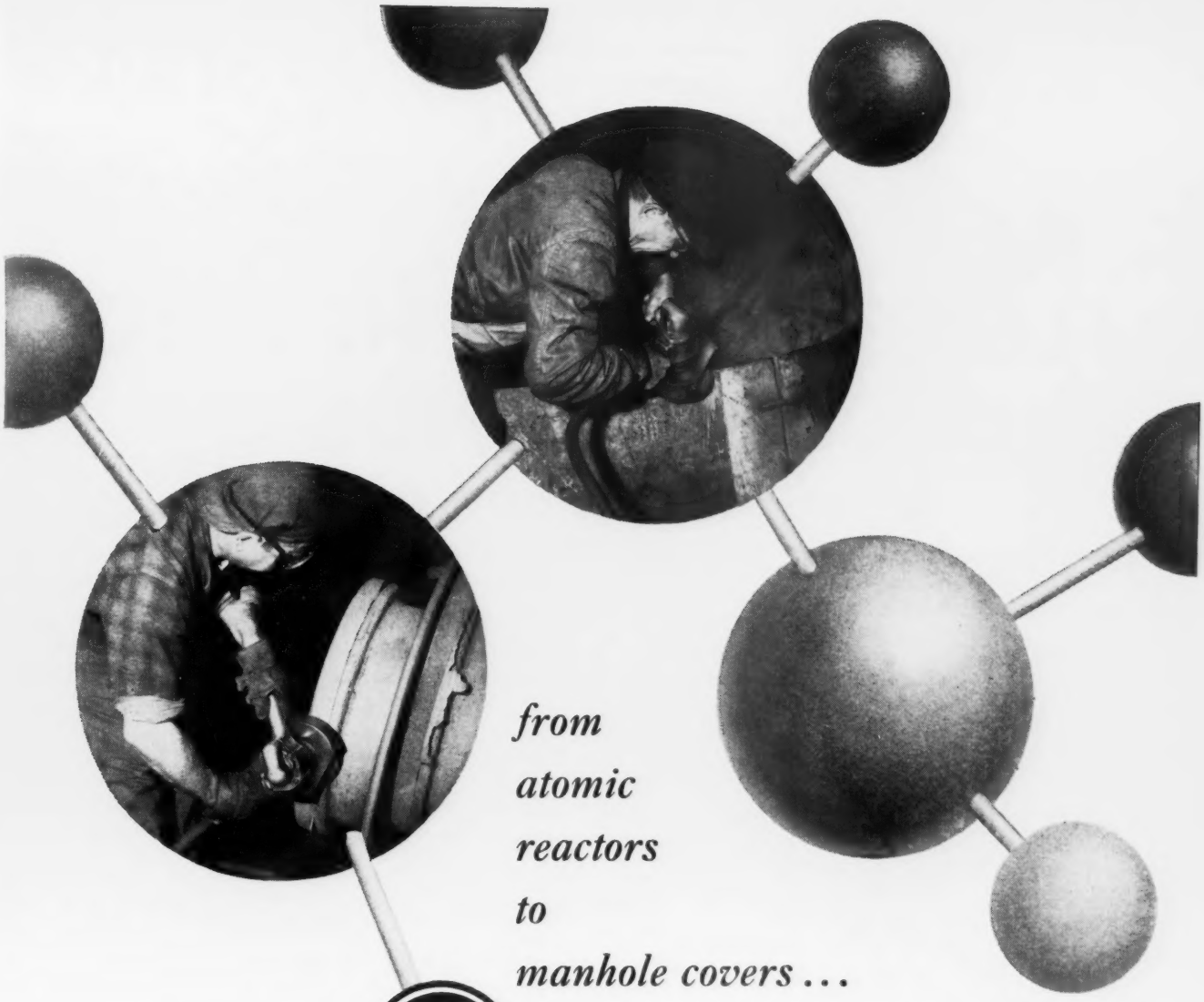
Write for Lectromelt Furnace Catalogue No. 9. Request any engineering information you require. Pittsburgh Lectromelt Furnace Corporation, 314 32nd Street, Pittsburgh 30, Pennsylvania.

Manufactured in . . . GERMANY: Friedrich Kocks GMBH, Dusseldorf . . . ENGLAND: Birlec, Ltd., Birmingham . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa. JAPAN: Daido Steel Co., Ltd., Nagoya

*REG. T. M. U. S. PAT. OFF.

MOORE RAPID

WHEN YOU MELT... *Lectromelt*



from atomic reactors to manhole covers . . .

7 pound CP grinder grinds them all!

Here's a grinder that can't be beat for handling ease and versatility. It's the 7 lb. air powered CP-3190 Vertical Grinder. Whatever the job . . . whether it's precision contour grinding for joining components of an atomic reactor or the heavy duty snagging of grey iron from manhole cover castings, the compact CP-3190 affords maximum removal of metal with the least amount of effort.

Designed for long life and an absolute minimum of maintenance, the CP-3190 has a splined type floating rotor that prevents end-plate wear from wheel thrust. A large oil reservoir and self-lubricator provide continuous lubrication. Available in capacities capable of handling 6″ cup wheels and 7″ and 9″ disc sanding pads and cut-off wheels and in speeds up to 8000 RPM.

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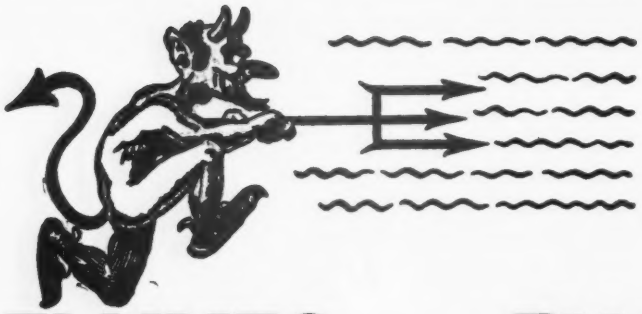

Soffel's

FLUXES and EXOTHERMIC COMPOUNDS

for *all* Metals and Alloys

THERMOTOMIC "X" COMPOUND is an exothermic material which is molded and baked into necked down riser cores and inserts. It produces a temperature of 3500° F. and is used as ring inserts under the risers or feeding heads. Great savings are realized through reduced riser dimensions and cleaning costs. In conjunction with Thermotomic Compounds, Carbon Free Liquidizer No. 5 should be used on top of the metal in the heads.

THERMOTOMIC ABC—For aluminum and magnesium castings, necked down riser cores and inserts—prevents piping and shrinkage into castings. Soffel's ALX-31 Liquidizer should be used on top of the metals in the head.

THERMOTOMIC "HoTop" LIQUIDIZER — For short risers—saves 60 to 70% of feeding metal in the heads.

EXOTHERMIC CARBON FREE LIQUIDIZER—A feeding head compound for castings and ingots of ferrous and non-ferrous metals — saves metal and prevents piping and shrinkage.

CARBON FREE LIQUIDIZER AL-X31—For aluminum and magnesium feeding heads—prevents piping.

EXOTHERMIC INSULATING SLEEVE CORE COMPOUND—For riser sleeves—adds heat and prolongs fluidity of feeding metal in heads or risers.

DENSILTITE LADLE FLUX—For iron and semi-steel—reduces sulfur and phosphorus. Adds fluidity and temperature in pouring ladles—produces clean iron.

SOFFEL'S NON-FERROUS FLUXES

BB-2—For red brass, nickel and tin bronze pressure castings—removes sulfur, iron, phosphorus oxides and gas from brass and bronze.

SUPER BRASS FLUX—For brass and bronze—prevents oxidation of zinc.

BRASS REFINING FLUX—For cupola melting and open flame furnaces — prevents oxidation. Produces liquid slag and faster melting.

COVERALL BRASS FLUX—Removes gas and oxides from yellow brass and nickel silver.

RADIOCLARITE BRASS FLUX—For open flame furnace melting—increases fluidity, tensile strength, removes gas, oxides and iron.

AB-6 BRASS FLUX—For electric furnace melting of brass and aluminum bronze—keeps furnace linings clean.

KLEEN-ALL BRASS CLEANER—For use in bottom of pouring ladles or open flame furnaces to absorb liquid slag and keep the furnace and ladle linings clean.

BRASS ALUMINUM REMOVER — Removes all traces of aluminum from copper, brass or bronze.

HI-LED BRONZE FLUX—Holds lead up to 50% in copper without use of nickel.

NICKEL MONEL FLUX — Removes gas and adds fluidity to metal.

ALUMINUM BRONZE FLUX—A perfect deoxidizer for reducing aluminum and iron oxide in manganese bronze and aluminum bronze. Adds fluidity.

COPPERTITE FLUX—For high conductivity castings—removes cuprous and cupric oxides and gas from copper.

FERRO-OUT IRON REMOVER—Removes free iron or alloyed iron from brass, bronze or copper.

SOFFELITE ALUMINUM FLUX—Removes aluminum oxide and iron from aluminum and increases the fluidity and tensile strength.

MAGNALUM FLUX—For magnesium and aluminum alloys—removes gas and oxide and increases fluidity.

KLEN ZINC FLUX—A deoxidizer and purifier for zinc base pressure die castings—removes gas, sulfur and iron.

DIE COATING—For pressure zinc base die castings —will not scale, blister or create gas in the molds.

PERMANENT MOLD COATING—For aluminum and magnesium castings — adds longer life to molds. Produces clean gas free castings.

POT COATING—For iron pot melting — increases life of pots. Prevents iron pick up.

U. S. Patents No. 2,490,327 and No. 2,500,097

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Production men like WRIGHT HOISTS because they're built to "take it!"

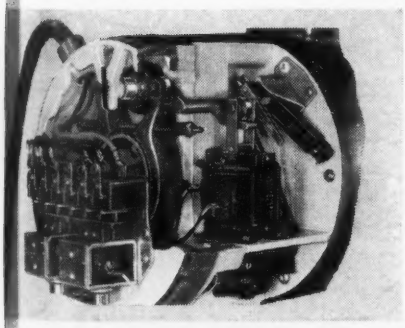
Wright Frame 1 Speedway ¼ to 1-ton

• Tough jobs demand tough tools. WRIGHT's heavy duty design, choice of superior components and perfectly balanced assembly make these hoists first choice of production men. You can count on them for your most critical material-handling jobs. Avoid "down time." Buy WRIGHT and be sure.

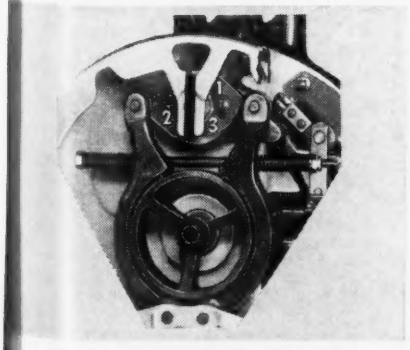
Superior long-life performance is a "dividend" production men have learned to expect from WRIGHT *Speedway* Hoists. This day-in, day-out trouble-free operation is built in at the WRIGHT factory.

Get the full WRIGHT story. A new booklet, #**DH-133B**, will show you how the new Model WRIGHT *Speedway* Frame 1 Hoists will handle tough jobs on any duty cycle for which 1½ HP, 30 minute NEMA motors are satisfactory. Compare the time-tested structural, electrical, and mechanical features and know why these hoists are favored by production men.

Maintenance requirements are simple and easy



Easiest to get at



Nothing to adjust but the cam!

• WRIGHT hoists are built right and properly adjusted at the factory. Only maintenance usually required is occasional compensation for brake lining wear.

This adjustment on the new *Speedways* is unusually simple as the photographs show. Loosening and removing a few screws allows the end housing and side cover to be removed. The cam settings which may be changed to compensate for brake lining wear are pre-determined and numbered. There is no guess work and the cam adjustment is the only one required. The long, calibrated compression springs and the solenoid are factory set —NEVER need adjustment for brake lining wear.

Write for this Booklet

Write our York, Pa., office for this New Booklet, #**DH-133B**. It describes the many electrical, mechanical, and structural features that make the new WRIGHT *Speedway* Electric Hoists, Frame 1 and 1½ (500 to 4000 lb. capacities) ideal for both production *and* maintenance men.

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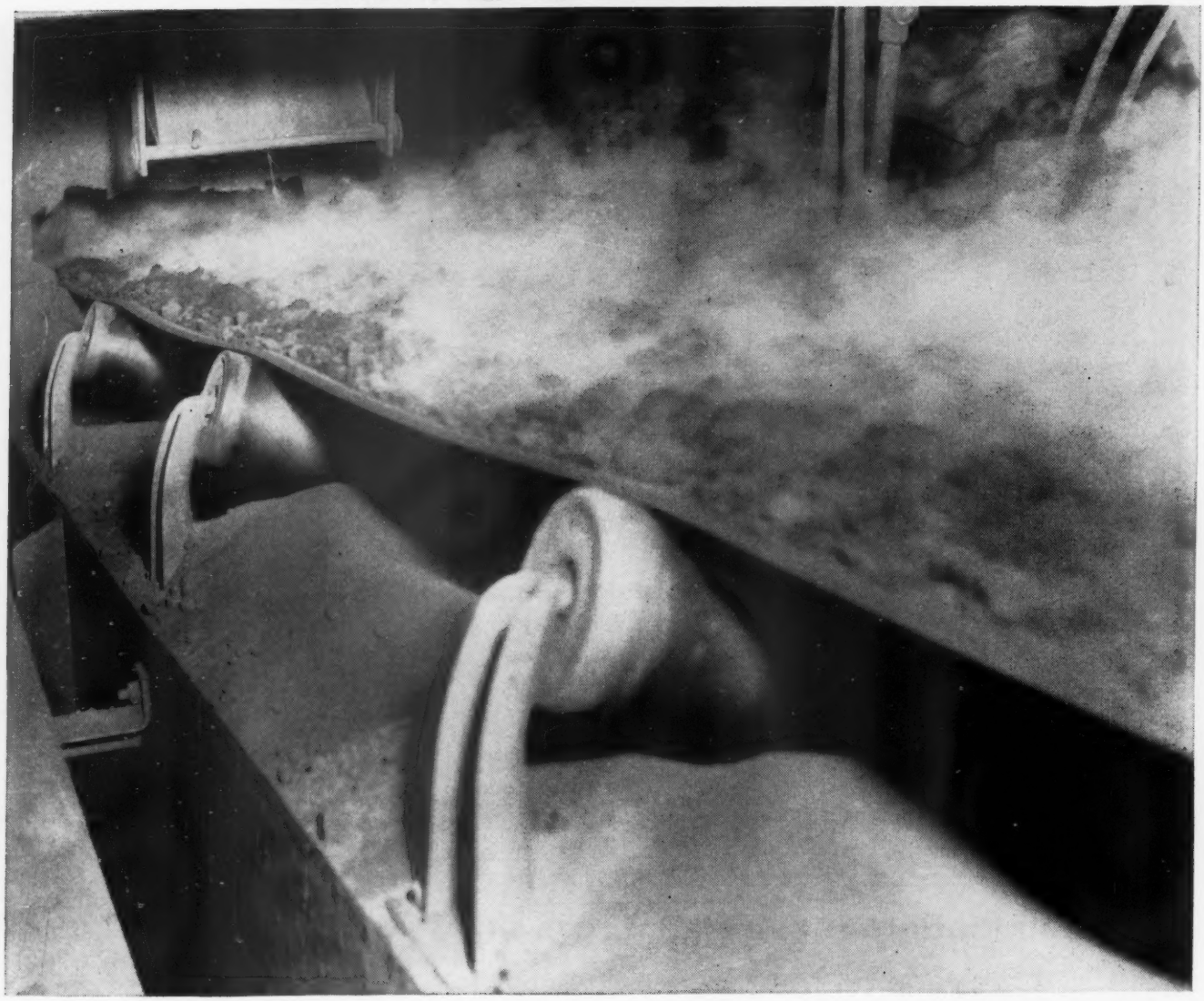
Cranes

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



Too hot to handle but it travels on rubber

A typical example of B. F. Goodrich improvement in rubber

THAT moving rubber platform is carrying sizzling hot chunks of iron and sand in a foundry. The heat had been ruining belts in a few months.

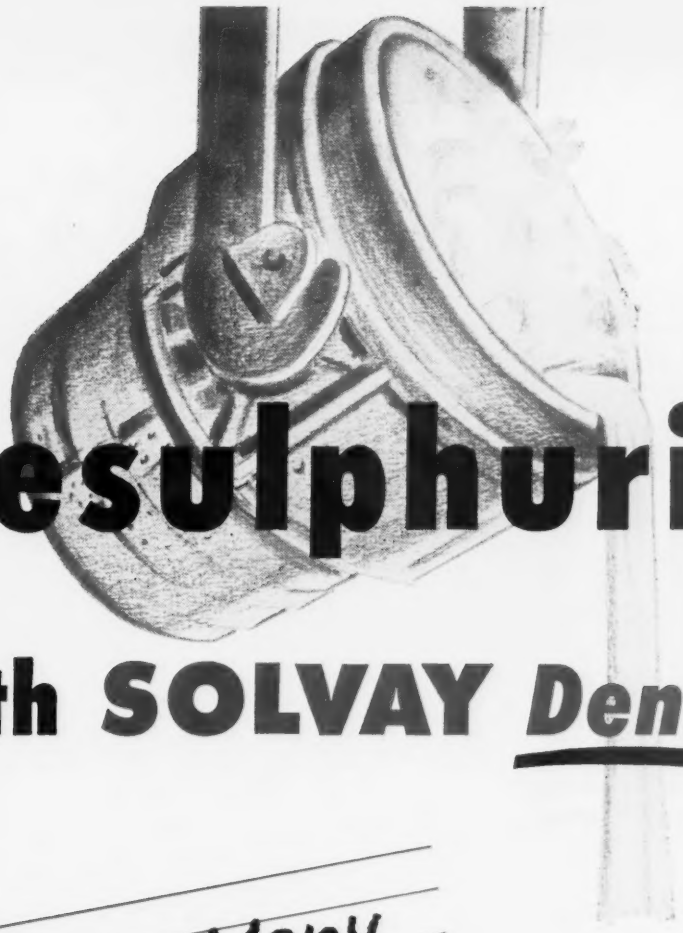
Then the company heard that B. F. Goodrich had developed a special heat-resisting rubber that can stand hot materials that would char or burn ordinary rubber. They built this rubber into a belt. Then, for good measure, added a layer of nylon cords near the surface to help prevent damaging cracks in the cover.

This improved B. F. Goodrich belt is what you see in the picture. It has already outlasted any other belt ever used here and looks good for double the life.

Product improvement is *always* going on at B. F. Goodrich. Some improvements are big, spectacular; some are little; many are too technical to explain easily, but all save you money. Every product gets its share—conveyor belts, V belts, every kind of hose, hundreds of others. None is ever regarded as "finished" or standardized.

How this cuts your costs: Biggest cost savings come almost always from top performance rather than lowest prices. If you use rubber products, remember B. F. Goodrich is one company that will *never* lower its quality standards. This means you can be sure of top performance and real money savings. If you want this extra value, these lower costs year after year, always call your B. F. Goodrich distributor. Find out about the latest improvements or try out the latest and best types of any rubber products you buy. *The B. F. Goodrich Company, Dept. M-397, Akron 18, Ohio.*

B.F.Goodrich
INDUSTRIAL PRODUCTS DIVISION



Desulphurization

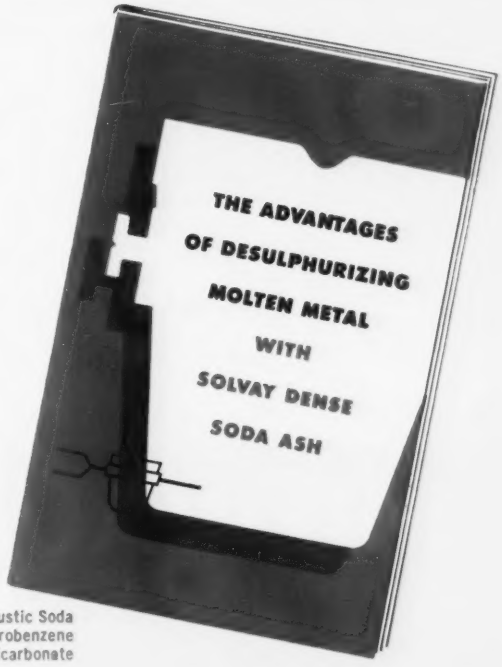
with SOLVAY *Dense* Soda Ash

SOLVAY DENSE SODA ASH has gained wide acceptance for efficient desulphurization. This 100% active material helps produce better, more fluid metal . . . and gives you these other advantages: it's free-flowing; the small grains melt very rapidly, allowing faster, more uniform dispersion; and it's easily added by means of simple equipment. The use of Solvay Dense Soda Ash is a flexible one—you use only as much as you need. And remember, Solvay Dense Soda Ash is the LOW COST form of desulphurization!

Further Information Contained in Valuable Book—Available on Request*

"The Advantages of Desulphurizing Molten Metal with Solvay Dense Soda Ash" has been published by Solvay for the benefit of the foundryman. It contains important information on the advantages you can gain by desulphurizing with Solvay Dense Soda Ash. It also explains what type of equipment is needed and how to obtain it. This book is available without cost or obligation*. Write for your copy today!

*In Western Hemisphere Countries.



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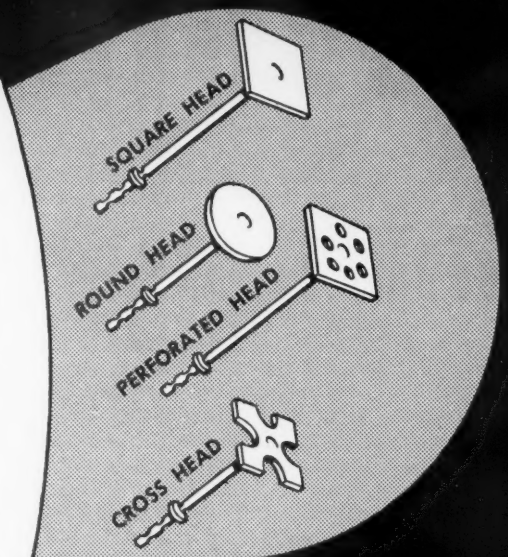
MILWAUKEE RADIATOR CHAPLETS

give you an *EXTRA* measure of Quality



For Automotive Castings, Stove Castings, Radiator Castings, or when any light pressure high quality castings are desired, be sure to specify MILWAUKEE CHAPLETS and get the very best in shoulder radiator chaplets.

They're precision made of laboratory controlled materials by skilled craftsmen using the most modern manufacturing facilities. You get these outstanding advantages:

• Rigid Specifications • Burr-Less Construction • Clean Break-Off Nicks • Five Inspections • Best Materials for Easy Fusions • Large Dia. of Shoulder for Easy Seating • Thin Shoulders Mean Less Grinding.

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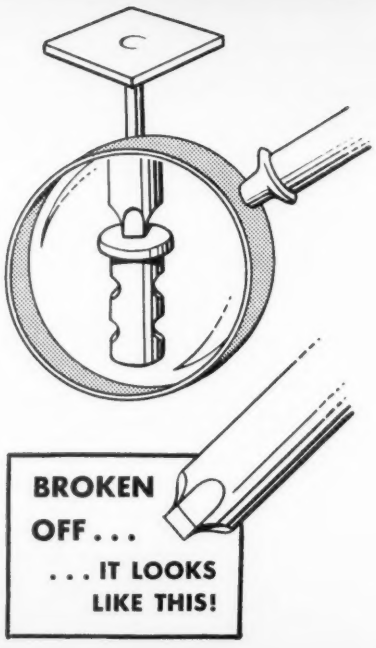
A TRUE FOUR-WAY BREAK-OFF NICK!

Developed at the request of a large Automotive Company, this is a true four-way nick for easy break-off.



MILWAUKEE CHAPLETS

MILWAUKEE CHAPLET & MFG. CO., INC. 1025 S. 40th STREET
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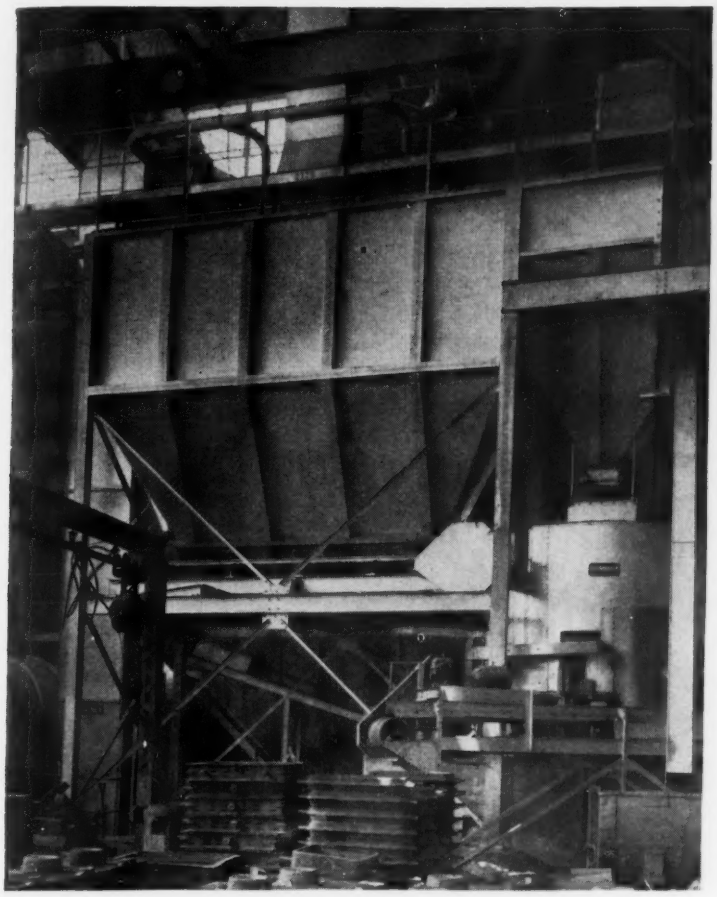
high quality castings need high quality foundry sand . . .



A Clearfield 930 Mixer is the heart of the sand conditioning system in a gray iron foundry.

and

<u>that</u>

calls for a

Clearfield Mixer

A Clearfield Mixer will consistently give you the quantity of sand when you need it, where you need it and with the desired qualities for your particular application. Clearfield Mixers are available in many sizes, to meet every requirement . . . as single units or as part of a sand processing system.

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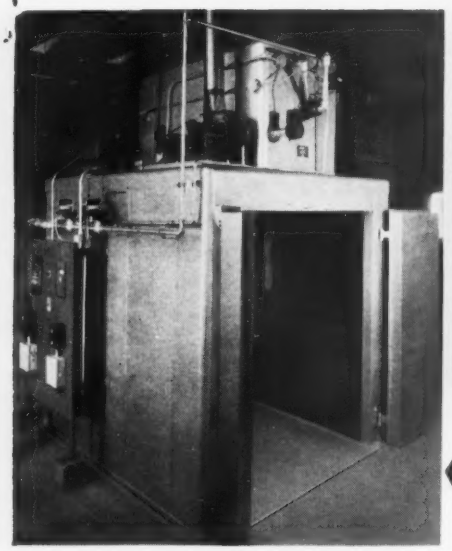
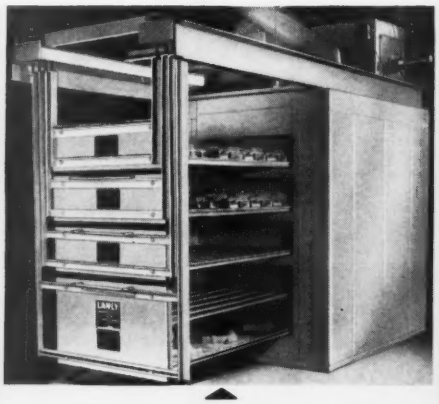
IS THE HEAVY HAND of OBSOLESCENCE Retarding Your Production

OLD STYLE, INEFFICIENT CORE OVENS

with antiquated hand firing and charging methods can add appreciably to your operating costs.

Then too, there is the problem of a high percentage of rejects in old oven production. Can you afford this?





1. Drawer Type Oven
2. Single Compartment Rack Type Oven
3. Car Type Oven

Isn't this an opportune time to examine closely the oven facilities of your foundry for a possible improvement? The average foundry requirements can be met with standard LANLY units. Custom designed units for core baking, pasting and mold drying are part of LANLY'S services, as well as ovens for casting conditioning and heat treating.

WRITE FOR THE LATEST CATALOG AND FACTS ON ANY INSTALLATION

LANLY FOUNDRY OVENS

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U. S. Patent #2184926 (Other patents pending)

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Is it rugged enough to prove itself in performance? You can't judge an abrasive by looks, claims or promises. The only test of any abrasive is its *cost per ton of castings cleaned.* Because of exclusive metallurgical characteristics, Malleabrasive gives you the lowest cost per ton cleaned of any premium abrasive on the market! This has been proved in hundreds of production tests by users throughout the country. Prove it in your own production test. *We GUARANTEE that Malleabrasive will give you lowest cost per ton of castings cleaned.*

To order Malleabrasive, or for additional information on running a test, contact PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

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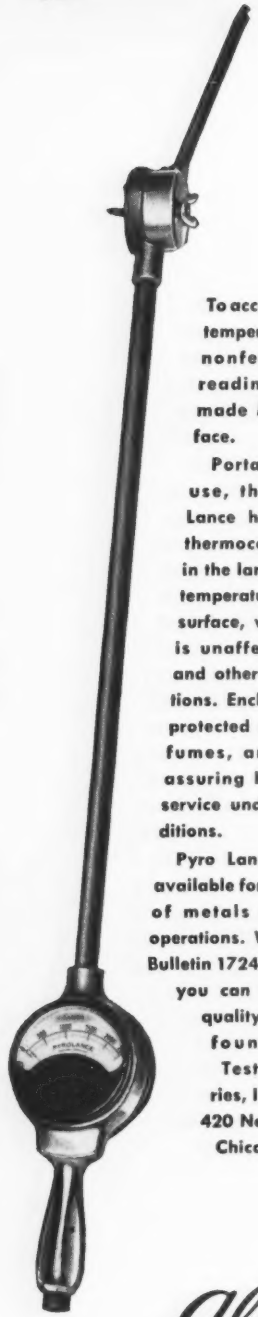
MALLEABRASIVE®

in nonferrous foundries
SURFACE INDICATIONS CAN BE
MISLEADING



To accurately measure temperature of molten, nonferrous metals, readings should be made *below* the surface.

Portable, handy to use, the Alnor Pyro Lance has a protected thermocouple mounted in the lance tip—it takes temperatures below the surface, where accuracy is unaffected by dross and other surface conditions. Enclosed couple is protected against flame, fumes, and corrosion, assuring long, accurate service under severe conditions.

Pyro Lance models are available for a wide variety of metals and foundry operations. Write today for Bulletin 1724-D and see how you can have low-cost quality control in your foundry. Illinois Testing Laboratories, Inc., Room 511, 420 North LaSalle St., Chicago 10, Illinois.

Alnor

PRECISION INSTRUMENTS FOR EVERY INDUSTRY

Readers' Comment

Readers OK Make-up Change

TO THE EDITORS:

Your new arrangement for printing your papers altogether in one location makes me very happy. Furthermore, your doing so will hereafter give me ammunition when I argue with other editors who tell me, either sadly or belligerently, that it can't be done. I sometimes wish the newspapers would follow suit although it is not so important in their case because you are not supposed to read anything after the first paragraph anyhow.

I may be mistaken—perhaps it is just a chore—but I do imagine that you have a lot of fun writing "With the Editors."

C. J. FREUND
Dean
College of Engineering
University of Detroit
4001 *W. McNichols Rd.*
Detroit 21

●

TO THE EDITORS:

Finally got time to go through the current FOUNDRY and wish to congratulate you on the elimination of that obnoxious and mentally distracting "Please turn to page 9009."

Thanks and good luck.

JAMES T. MACKENZIE
American Cast Iron Pipe Co.
Birmingham, Ala.

●

TO THE EDITORS:

Congratulations on the new make-up of FOUNDRY.

Not only is it better for filing purposes, but it is much more enjoyable and easier to read.

W. J. MAXWELL
Foundry Engineer
The Duriron Co. Inc.
Dayton, O.

●

TO THE EDITORS:

My thanks to Dr. MacKenzie. The old format was pretty discouraging so far as clipping was concerned.

H. W. LOWNIE JR.
Battelle Memorial Institute
505 *King Ave.*
Columbus 1, *O.*

●

TO THE EDITORS:

The change of "make-up" practice to keep entire articles together in a "lump" and not placed "in-part" here and there, is a most welcome idea in this foundry and office. We are very happy about it and we extend our sincere congratulations.

Either by personal subscription, or company subs, I have been receiving and reading and liking FOUNDRY magazine for over 20 years.

PAUL K. MITCHELL
Foundry Research Engineer
John Deere Waterloo Tractor Works
Waterloo, Iowa

* * *

FEF Comments Appreciated

TO THE EDITORS:

I should like to let you know how very much I, as an enthusiast of the Foundry Educational Foundation, appreciate the very fine comments you made in the recent issue of FOUNDRY magazine. I know this is one of many, but I could not help but express my sentiments to you on the matter.

M. J. ALLEN
Director,
Personnel & Public Relations
American Steel Foundries
400-410 *N. Michigan Ave.*
Chicago 11

●

TO THE EDITORS:

Yes, I think your editorial in the April issue hits the mark, especially the next to last paragraph. As you know, I've been very interested in the FEF work for some time, and I agree that we want to do everything possible to interest boys in taking foundry courses and to provide proper curricula for them. But the larger field of presenting the cast metal process to ALL engineers seems to afford the foundryman his best chance for the long pull. If my years in the business have taught me anything, I can clearly see this opportunity.

G. C. DICKEY
Works Manager
Harrison Steel Casting Co.
Attica, Ind.

* * *

Cover Makes a Hit

TO THE EDITORS:

This is just a note to say thank you for the very fine story appearing in the March issue of FOUNDRY concerning the U-505 tablet. We were very agreeably surprised to find the illustration showing our foundry superintendent on the cover. Needless to say, this publicity made a hit with the boys in the shop and all are requesting copies.

LEONARD H. GROSSE
President
Bronze Inc.
1250 *N. Central Park Ave.*
Chicago 51

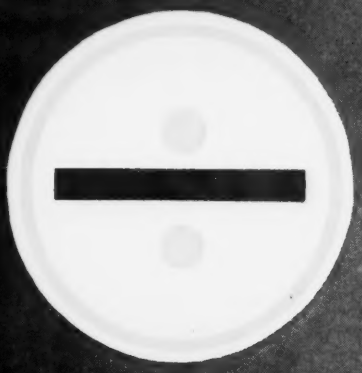
OREFRACTION

ZIRCON

SAND

AND

FLOUR



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- **Export Department:** 1010 Schaff Bldg. Philadelphia, Pa.
- **Foundry Supply Co. Inc.,** Minneapolis; St. Paul
- **Canadian Foundry Supplies & Equip. Co., Inc.,** Montreal; E. Maritimes

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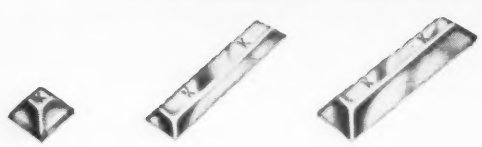
CHIEF KEOKUK:
"Me no need teach Little Chief—him say modern generation learn make teepee on TV!"

PRINCESS WENATCHEE:
"As usual he has the situation well under control!"

KEOKUK **ELECTRO-METALS COMPANY**
KEOKUK, IOWA
WENATCHEE DIVISION, WENATCHEE, WASHINGTON



Keokuk Silvery . . . the *superior* form of silicon introduction for steel plants and foundries . . . available in 60 and 30 lb. pigs and 12½ lb. piglets . . . in regular or alloy analysis. Keokuk also manufactures high silicon metal.

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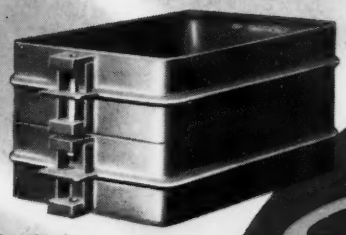
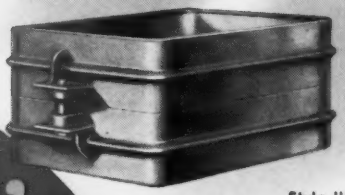
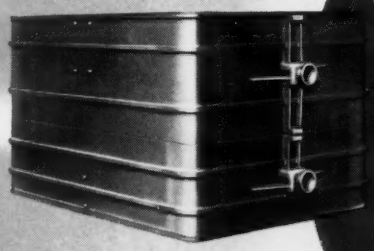


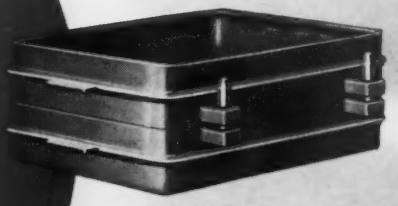
Style "AD" with Double Pin Lugs



Style "E"
with Pin Lugs and Handles Combined

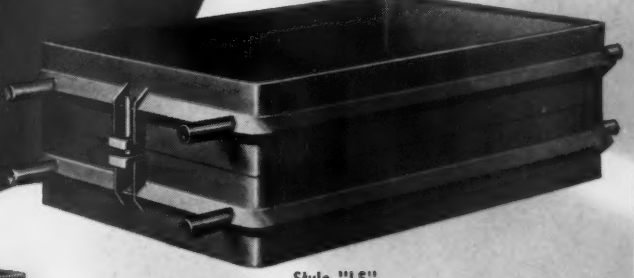


Style "⅜ND-RT Cope" } Heavy Duty Flask
Style "⅜NS-RT Drag"

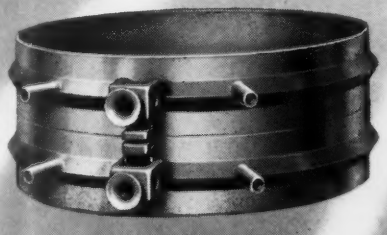


Style "H" with Pin Lugs Welded on Sides

Style "GSX"
with Single Pin Lugs and Two-Man Lift Handles



Style "LS"
with Angle Reinforcement and Two-Man Lift Handles



Style "BLST"
with Trunnions and Two-Man Lift Handles

Style "AD" Flask Sections Stacked One Above Another
for Multiple Molding

Style "⅜ND-RTX Cope" — Style "⅜NS-RT Drag"
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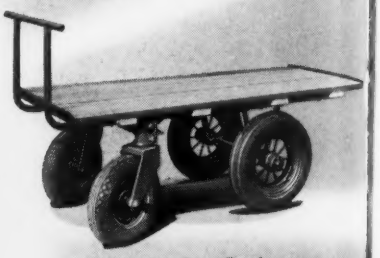
No. 47 Casting Cart

No. 50 Slag Buggy



No. 110 Core Truck

No. D4W Wheelbarrow for sand and other dry materials

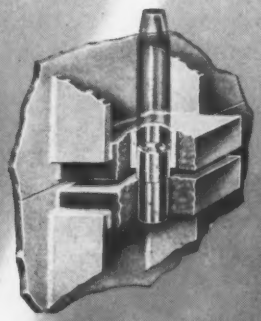
No. 160 Heavy Duty Casting Truck

Heavy Duty Cart with "3-Point Landing"

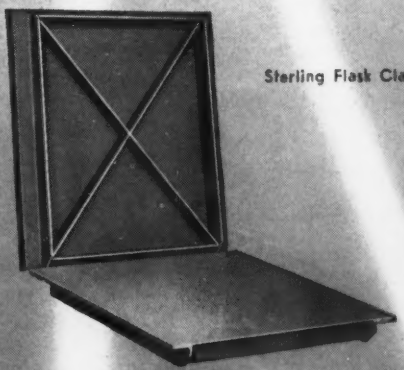
Standard Type "S" Flask Pin

Sterling Flask Clamp

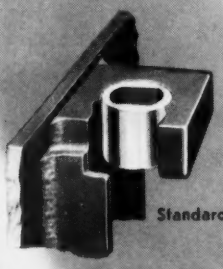
No. 630-S Cart with Steel Wheels



Stub Pin Shift-proof



Style X Core Plate



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Apply What We Know

Foundries continue to make considerable progress in methods of producing castings. An idea of the developments that have taken place during the past few years in the fields of molding, melting, metals, heat treating and testing may be obtained from the "Special Study of Foundry Processes" prepared by 26 authorities in the field of castings production and presented in this issue (pages 106 to 127).

An even broader understanding of the technical progress of the industry may be found in the many papers included in the program for the Houston convention of the American Foundrymen's Society (pages 138 to 143).

Foundry operators, engineers, scientists, research organizations, technical schools, manufacturers of equipment and producers of supplies all are working toward the production of better castings at a lower price.

Much headway is being made as many contribute to the common good, and undoubtedly this development phase will continue. But the gain to the foundry industry will be small unless improvements in practice are applied to the every-day production problems in all foundries. It will do no good to know how to make better castings unless the knowledge is put into practice. Therefore, it might be well if the management team of each foundry would determine if the organization is producing castings of a quality commensurate with the advanced knowledge of the foundry industry. If not, let's get busy and apply what we know.

Skillful selling must be coupled with knowledge of modern manufacturing methods if the foundry is to be successful. As a part of the sales operation, castings should be designed to provide maximum service for the application intended, but within the limitations directed by good foundry practice. Here again, the need for an understanding of technological advancements in castings production is of major importance.

Detailed information on materials, methods and machines is available from many sources, including business magazines, technical papers and committee reports. Developments are discussed at many meetings on the national, district and local levels. Vendors of equipment and supplies are excellent sources of news on recent advancements.

While research and development go forward, the foundry undoubtedly can make great strides in quality improvement by applying the data that already is available.

Frank G. Steinebach

Editor

PROCESS ENGINEERING

In the Foundry Industry

Foundries can profit from the relatively new field of process engineering which has appeared in the industry within recent years. How process engineers work to improve casting quality and economy of foundry operation is described in this article

By JEROME R. YOUNG
Process Engineer
Cadillac Motor Car Division
General Motors Corp., Detroit

MAJOR objective of all foundrymen is to produce the highest quality product at the lowest cost. Today that job is easier than it has been at any time in the past. Rapid advancement in foundry processes, materials and equipment have changed the concept of foundry work. Automation has jumped into the industry. Precision molding practices have opened the eyes of foundrymen and customers alike. New metals and alloys have pushed mechanical properties of parts higher.

Revised thinking regarding casting design is awakening the industry to the possibilities of engineering a part for its intended service. Studies of new gating methods have shown the errors in some older systems. Quality control programs, sound costing and pricing practices and common sense work planning and scheduling are showing the way to better quality and economy.

Yes, foundrymen have many tools to help them meet their objective. But in the average foundry the line supervisor who largely is responsible for the success of a foundry operation is faced with many everyday problems. Getting top production is his main worry. In addition, he must organize departmental activities, plan and schedule work, provide employees with proper tools and materials, maintain good labor relations, train employees, uphold company policy, represent employees to the company and be responsible for product quality, maintenance and employee safety. And he always must look for ways to improve casting quality and production methods.

It's that last point that gets him. The demands of all his other duties do not allow sufficient time for the supervisor to try new materials, new equipment, new methods and perform the necessary follow-up to evaluate properly the results of the trials. But someone must do that job if casting quality is to be improved and costs reduced.

The Process Engineer—Here is where the process engineer steps into the picture. He should be a man with a basic engineering education, trained to evaluate a trial or test on a new method or material by gathering all pertinent facts and eliminating opinion—the scientific approach. By developing this approach, management receives factual, comprehensive data from which a decision can be made on the usefulness of the new item under study. The process engineer can present his facts best by maintaining a permanent set of records to provide a firm basis for evaluating new ideas and to provide a history for future reference.

The basic project, whether it be the study of a new material, a new process or an attempt to solve a recurring scrap problem should be agreed upon by management, supervision, engineering and inspection. The process engineer then should set up a project sheet stating the overall objective and plan of approach. In the sample project sheet shown, use of finer sand is thought to be the most logical approach to solving an engineering department problem. The objective is listed and a method of attack outlined. This is the process engineer's guide in formulating trials and tests to arrive at the objective.

As the program is followed through, progress reports like the sample shown are issued to inform all personnel concerned of the progress made toward a satisfactory solution.

The process engineer's responsibility should be directly to management. He should have access to information in all departments and should work directly with line supervisors on the various projects under study.

Furnish Facts to Management—New materials are entering the foundry industry in a constant stream, but unless they are tested and tried in each foundry with its own applications their importance can not be evaluated. Let us say, for example, that a new core wash is advertised to have far superior properties than anything else on the market. The process engineer, with the assistance of the supervisors, studies all items relating to the wash—determines the correct Baume, best method of application, relative cost, casting

In the pages that follow, authorities in various fields report on recent progress in molding, melting, metals, heat treating and testing. Gathered here in one package are many ideas on which to base several successful process engineering programs.

finish obtained—and makes his recommendations as to its use. Management then has all pertinent facts to determine the value of the wash.

In another instance perhaps a particular job has a high scrap loss due to a certain defect. There are many possible causes and each one must be tracked down systematically to determine the one responsible. Suppose in this case it is decided that a change in gating would eliminate the cause. To establish the new gating system would require a series of trials. That would be the job of the process engineer.

There always are special projects which need attention, but they take time and effort away from production. Many of these projects arise from suggestion plans used in numerous plants. These suggestions can be handled by the process engineer whose primary concern is not production, but quality of product. He can investigate the ideas and report on their applications, thus relieving supervision of this important but time-consuming job. Quality control programs which are reducing costs and improving quality in many foundries are a natural for the engineer who is trained in statistics.

Several of the larger foundries are using one or more process engineers. But can the small or average size foundry afford the services of such a man? The answer is an unqualified "yes." Adoption of a more economical method or material to give the same or better quality results can easily justify this man. Personnel problems, productivity and other factors take proportionately as much time in a 25-ton-per-day plant as in a 500-ton-per-day operation. One shop has as much to gain as another through the use of better methods and materials.

In today's competitive market, the process engineer, through a systematic improvement plan, can help every foundry take advantage of the newest developments in materials, methods and equipment to produce castings of the highest possible quality at the lowest possible cost.

PROJECT SHEET

Better Methods Program, Foundry Division

Project: Number 3.

Project Title: Usage of Fine Grain Sand.

Department: Coreroom and Molding Lines.

Objective: To improve the interior and exterior finish of all castings.

Sponsor: Engineering Department.

Detail: The Engineering Department has requested the Foundry to improve exterior casting finish for better appearance and easier machining. Interior finish must be improved primarily for cleaner water and air passages. It has been agreed by all personnel concerned that the most acceptable method of accomplishing these objectives will be conversion to a finer sand.

Development: The fine sand will be introduced into the coreroom where trials will be conducted to determine the most desirable grain fineness and grain distribution and develop the core sand mixes which will give the best results. When this phase of the project is completed, the molding sand will be converted with trials to determine the sand additions and necessary changes in gating, venting, etc.

Potential: The project is scheduled for completion in six months and it is certain that improved casting quality will be realized by this change. Information will be distributed in the form of Progress Reports as it becomes available.

J. R. Young
Process Engineer

cc: Management, Engineering, Inspection, Foundry Supervision

PROGRESS REPORT

Better Methods Program, Foundry Division
Project #3—Progress Report #4
Mar. 1, 1955

Purpose

The following trial was conducted to investigate further the properties of fine sand in the core room.

Work Performed

The same core sand mix as reported in Progress Report #3 was run for a 16-hr period on all chunk cores. All new fine sand was used for a comparison of bakeout properties.

Results

This trial was conducted as a result of the satisfactory 2-hr trial completed Feb. 25. The physical properties received during this trial compare favorably with those received with regular sand. The grain fineness again was 55 with a 3-screen sand. There was a tendency, toward the end of the run, to a buildup at the screens which would indicate that some sand is blowing through the screens. To eliminate this condition a finer mesh screen will be purchased and tried. A definite improvement in casting finish was observed with no apparent increase in defects. The cores were well baked with a low gas evolution. Inspection results of castings produced were as follows: 223 castings inspected, 5 Blows—welded, 0 Scrap.

Conclusions and Recommendations

Thus far the sand on the chunk core mix has shown a definite improvement in casting finish with no increase in defects. A one-week trial will be conducted from Mar. 5 to 10. Trials will be started on small section cores to determine the effects of finer sand. Trials to date indicate that the use of finer sand is feasible and can be accomplished with minor changes in the core sand mixes. Results of further trials will be forthcoming in subsequent Progress Reports.

J. R. Young
Process Engineer

cc: Management, Engineering, Inspection, Foundry Supervision

Special Report on . . .

FOUNDRY MOLDING

methods have been improved by mechanical and product developments and by refinement of techniques. Greater stress is being placed on quality control. So-called "precision" molding methods are claiming a larger share of castings production

Improve Mechanics of Permanent Mold Work

By ALFRED SUGAR
Alloys & Chemicals Mfg. Co.
Cleveland

MOST DEVELOPMENTS in permanent mold casting over the last few years have been along mechanical lines. As in all types of manufacturing, the lack of experienced help has forced the industry to mechanize every operation possible. Single molds now are being operated mechanically rather than by hand. In many cases where thermal conditions on a number of molds can be equalized, these mechanically actuated molds have been put on turntables where three operators can run ten or more molds, thus increasing production and at the same time decreasing labor costs.

Section thicknesses, a big factor in the thermal control of molds, have been and are being held at a point determined over many years of trial and error. However, in spite of the effort to keep overall weight down, molds have become slightly heavier due to additional ribbing to control warpage and to the addition of lugs and supports for clamps and mechanical actuating units.

Turbulence in filling molds always has been a big problem in the production of permanent mold castings. To reduce turbulence, the recent trend has been to use thinner gates and lighter risers. This has necessitated considerably more thought in the location of gates and risers as well as in their design, but even with such greater effort, proper feeding of castings through lighter gating systems still is a difficult problem. Decrease in feeding has been compensated for partially by the use of boiling fluxes. The judicious and controlled gassing of metal has become quite widespread through the permanent mold casting industry and has helped tremendously in the production of good castings where the molds have been either poorly gated or markedly under-gated.

With the increased popularity of electric cooking, the demand for cast-in calrod units in per-

PROCESSES

manent mold castings has skyrocketed. Permanent mold foundries have met this demand with rather mixed success. While no one foundry has this type of casting completely under control, enough progress has been made within the last year to indicate that calrod units cast-in in permanent mold casting will not be a headache much longer.

Cast Multiple Metal Parts Centrifugally

By DR. A. E. SCHUH
U. S. Pipe & Foundry Co.
Burlington, N. J.

IN CENTRIFUGAL casting work the largest commercial activity continues to be the casting of cast iron pressure pipe, primarily for the urban distribution of water and gas. The two main spinning processes are by the use of sand lined molds and by the use of water cooled metal molds, the latter accounting for the major share of production. Over a million tons of pipe are cast annually by these two processes.

The metal mold pipe process has been improved by spraying the interior of the mold with a thin coating of a rough-textured refractory material before each cast. This coating has served to improve the outer surface of the cast pipe, eliminating skin defects and enhancing resistance to bending stresses. The method is becoming increasingly adopted.

During recent years the application of centrifugal castings to a wide variety of end uses other than cast iron pressure pipe has come into the picture. The metals employed cover all of the ferrous family and some nonferrous materials. The tubular products are being used where high temperatures, high pressures, special corrosive and erosive conditions, or combinations of these come into play. However, many applications exist where these materials and their demands are more conventional. Over the past few years the range of sizes of such spun products, by way of wall thicknesses, diameters and lengths, has been expanded considerably.

Perhaps the most interesting and promising of the new developments in centrifugal casting is the production of multiple metal castings, in which the metal process permits the intimate and complete bonding of two or more dissimilar metals into one cylinder during the casting operation, providing thereby a single structure whose inner and outer surfaces combine widely different service properties which no single alloy can offer. Such products are finding increasing use in many of the chemical and mechanical processing industries.

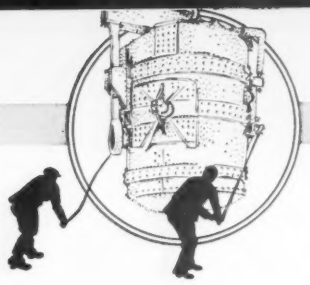
Among such applications might be mentioned dual metal rolls of white and gray iron for the grinding of flour, paints, inks, chocolate, and similar products. Another is a combination of stainless steel, lined with a gray iron core for use as padder rolls in the impregnation of textiles. A third is in the petroleum industry in which the erosion by catalysts in the lift towers of cracking units is drastically reduced by lining an outer centrifugally cast steel shell with an abrasion resistant inner metal. Many other new combinations of metals are undergoing extensive field appraisal.

Refinements in Process Feature Shell Molding

By J. E. BOLT
General Electric Co.
Pittsfield, Mass.

SHELL MOLDING, the post-war foundry curiosity, now has reached full production status. In many foundries, shell molding has become a separate department, or is independently housed. Vigorous growth is evident throughout the country with foundries entering into and progressing rapidly through developmental and pilot stages to full production.

Foundries need no longer delay starting shell production for lack of good equipment and supplies. A current survey reveals that there are 16



manufacturers of shell molding machines, two of shell bonding machines, five of shell core blowers, and one of specifically designed machines for blowing shell molds. Suitable sands processed for shell molding, both premium and local, are in good supply. Resin producers now manufacture shell resins with consistent batch-to-batch uniformity.

Shell molding has grown rapidly. This is apparent from the following estimates of shell molding resins sold in the United States since 1947:

1947-1949—less than 0.25 million lb per yr
1950—0.25 million lb per yr
1951—0.50 million lb per yr
1952—3.0 million lb per yr
1953—5.0 million lb per yr
1954—8.0 million lb per yr

Fundamentals of the process as now commonly employed are much the same as the original concepts. With variations, the rollover-dumpbox technique still is used. Beyond this, however, there have been numerous process refinements. Perhaps the most notable is the bonding of shell halves together. Compared to former methods of clamps, staples, and bolts, the net results have meant great savings in production time and labor, and improved dimensional stability of the assembled shell. Other process refinements have been in the horizontal positioning of shells and, with good bonding, the elimination of a back-up material. Where these techniques are feasible, their adoption can make the difference between profit and loss.

Related to shell molding are the recent applications in stack molding using shell materials. Stack molds are made either by blowing or by surface grinding the backs of conventional shells.

Shell molding has spread into many fields. Diversified items are now being produced such as gears with teeth usable as-cast, hardware items requiring only a surface grinding, pipe fittings, crankshafts and flatiron bases. Imagination has stimulated many new applications. Castings are now being produced successfully in metals ranging from stainless steel to 10K gold.

Current progressive activities are centered around the development of resin coated sands, easily processed with existing foundry equipment. Resin producers now are working on this. The ideal molding medium desired by many prominent shell foundrymen is a "universal mix" suitable for making shells or cores, employing a single sand, a single resin, and a simple coating process. Equipment development concurrently is underway. The trend appears to be toward the blowing of both shells and cores. Already coreblowing operations using rapid-cure coating resins and curing in the box look extremely promising.

Research Gating Data Finds Practical Use

By J. G. KURA
Battelle Memorial Institute
Columbus, O.

PRIME FUNCTION of a gating system is to channel clean, liquid metal into the mold cavity in a manner that will produce a sound casting. Gating techniques can and do vary considerably, depending upon type of metal or alloy poured, size and shape of the casting, and the quality required for the service in which the casting will be used.

Problems in gating usually arise when the need for high-quality castings is mandatory. It is in such instances that an understanding of the principles of gating is a tremendous aid to foundrymen. Fortunately, research has been in progress in this field, and results of the research are being applied successfully in commercial practice.

Consensus on some features of a good gating system is becoming more apparent in recent years. The first consideration is that the casting should be poured at a rate that will not cause misruns or upset desirable temperature gradients. The desired pouring rate should be achieved not by employing a choke or skim core in the runner system but by adjusting the sprue size to make its cross section the controlling factor. Next, the sprue should be tapered with the larger end at the top if aspiration of air and mold gases through the sprue wall is a problem. A well or an enlargement of the runner at the sprue base aids in minimizing turbulence at initiation of the pour and also absorbs a considerable amount of kinetic energy in the stream flowing down the sprue.

When pouring rate is controlled by the sprue diameter, decrease in velocity in the runner is proportional to the increase in its cross-sectional area. Thus, larger runners with total area of the gates equal to the area of the runner minimize jetting of the stream into the mold cavity.

Turbulence at the start of the pour is difficult to avoid completely. A pouring basin or a generously flared opening at the top of the sprue, when filled quickly and kept full, aids in minimizing turbulence that creates and entrains dross. A large proportion of the dross or slag can be trapped on the cope surface of the runner, if the runner is filled before liquid enters the mold cavity. This condition can be achieved by placing the runners in the drag and the gates in the cope. An extension of the runner past the last gate is effective

in trapping dirt washed in by the initial stream. Rounding corners of the flow channel where direction of flow is abruptly changed also aids in minimizing turbulence and aspiration of mold gases.

Those metals that are particularly prone to formation of dross must not be cascaded into the mold cavity. Bottom gating then is mandatory but is considered undesirable because of reversed temperature gradients in the casting. Some evidence exists that, because of convection, the top is hotter than the bottom of bottom-gated iron castings when the casting is thicker than one inch and is poured at high temperatures. Bottom gating of vertical castings can be done successfully by running metal up from the bottom of a side riser attached to the casting by a web or slot section. With a gating system that produces a velocity low enough so that jetting into the side riser is avoided, clean metal enters the mold cavity, hot metal reaches the top portion of the casting, and the side riser feeds the casting.

As a result of research being conducted on gating systems, foundrymen now are in a better position to apply tested principles to solve specific problems. Gating is a complex problem and additional research is desirable. Because the best gating practice is dictated by casting design, foundrymen still must exercise good judgment and, at times, great ingenuity.

Bonding shells with dry resin is one refinement of many in the fast-growing shell molding field

High Pressure Molding Serves Various Needs

By THOMAS E. BARLOW

Eastern Clay Products Dept.,
International Mineral & Chemical Corp.
Chicago

FULL PRODUCTION with the diaphragm method of pressure molding was realized almost three years before the operation was presented publicly to the foundry industry at the AFS foundry show in Cleveland, May, 1954. Since then, the process has been put into successful operation in foundries producing gray iron, steel, malleable, copper base alloys and aluminum. Flask sizes in production range from 12 x 14 in. up to 42 x 76 in. Casting weights range from a few ounces to approximately one ton. Production rates vary from as low as 50 molds per day to as high as 270 molds per hour per machine.

Another type of high pressure equipment referred to as high pressure blow-squeeze is in full production for stack molding in a malleable foundry. This operation is rated at 200 cheeks (12 x 18 x 3 in.) per hour or 200 stacks of eight cheeks per day per machine. The operation specializes in small castings, 24 per cheek or 192 per stack.

Pressure molding originated for the purpose of developing close tolerances, improved finish and casting detail in a typical but modified green sand foundry practice. Today, it embraces a much wider field of application by including castings with precision somewhat between that of ordinary practice and that of true "precision casting." Many applications use the process only for combining better finish and closer weight control with high production while others minimize the importance of production rates and specialize in producing the ultimate in finish and dimensional tolerance.

Versatility of the process complicates any description of the exact technique involved. Results obtained depend upon the degree to which precise pattern equipment, high squeeze pressure, sand flowability and sand fineness are combined. For example, if "precision" castings are desired, the patterns, flasks and flask bushings are held to extremely close tolerances. Sands of 100 to 130 AGF treated with proprietary high flowability additives are employed. In these cases, tolerances of a few thousandths of an inch per inch are developed.

At the opposite end of the scale the operation involves only high production combined with improved commercial finishes and reduced casting weight. In these cases, the sand practice and pattern practice are normal (but good) and only the squeeze pressure and contour of squeeze are changed.

We probably also should include those castings being produced with unusual or extra hard ramming with normal equipment, or fine sands treated for maximum flowability and finish. Such castings are in routine production with special facing sands which produce castings sufficiently to size

to eliminate many machining or finishing operations. In these cases, special sand is combined with standard molding equipment of such a size as to develop the unusually hard, dense mold needed for close tolerance and maximum finish. Sand additives permit the use of high strength, low moisture and high flowability essential under the conditions of hard ramming.

Since results are determined by pattern equipment, squeeze pressure, sand fineness and sand flowability, they are most easily discussed and appreciated as separate items. However, it must be remembered that the effectiveness of pressure molding and, therefore, the type of finish and dimensional control developed depends upon the degree to which these four factors are combined or ignored.

Pressure molding is green sand molding but the relationship is somewhat like the relationship between the C and D processes and the older parent process of baked molds or cores. In other words, it is a modification of existing knowledge using the most up-to-date information on pattern practice, sand practice and molding equipment.

New Products Are Aid To Patternmakers

By JOHN F. ROTH
Cleveland Standard Pattern Co.
Cleveland

THE OBLIGATION of the pattern shop to furnish pattern equipment suitable and practical to the foundry is of prime importance. Unless the patternmaker spends the time necessary discussing production problems with the foundry and analyzing the required equipment, he is not prepared to furnish this very important foundry tool. In the absence of journeymen molders the patternmaker assumes additional responsibility in foundry simplification. Patterns built to provide "flat backs," while necessarily requiring additional coring, are suitable for mounting and consequently eliminate any cut partings.

While shell molding pattern and corebox work is somewhat undeveloped in the Cleveland area, the demands of the process must be considered. They require additional knowledge on the part of the patternmaker. The pattern shop producing shell mold patterns has a labor training problem, plus the necessity, as a rule, of capital investment in additional metalworking equipment. These machines, gages, and other measuring devices must be sufficiently accurate to permit pattern tolerances within ± 0.001 and ± 0.002.

An increase in the average age of patternmakers indicates the industry must reconsider its training responsibilities. Cleveland pattern manufacturers have approached the problem by contacting the junior and senior high schools with the story of opportunities in the pattern and foundry industries. A direct corollary is the planned Cleveland Trade School, scheduled for completion in 1956. This school will house one of the best equipped pattern shops in the country, with classes in charge of Frank Cech, veteran instructor, and present national director of the AFS.

New methods required to produce better patterns vary greatly from wood to metal, and from region to region, as demand dictates. In the wood application, new plywood products are available, having interesting possibilities in the form of detachable sheathing stock. Plastic-coated plywood used in this manner has excellent drawing characteristics and can be replaced in sheet form when badly worn. Cold glues have been improved, are much superior to the original product and are becoming increasingly popular. Many improved products are available in pattern coatings, and with increased manufacturing costs the best coating obtainable should be applied. Shellac, universally used for many years, apparently is fighting a losing battle. A plaster release agent recently tested by our firm has shown marked superiority over any similar product.

New methods in metal patternmaking have been centered about the demands for shell mold patterns and duplicate high production equipments. The consequent search for precision pattern castings requiring a minimum of clean-up and machining time is understandable. Aluminum pattern alloys may be cast to closer tolerances than bronze, gray iron or Meehanite but do not have as good wearing qualities for long production runs or the resistance to chemical reaction with shell molding resins. In this respect, however, a better-than-average aluminum alloy is No. 142. Patterns of this alloy must be heat treated and stress relieved.

Recent research developments include metal applications, pattern coatings and plaster releases, as previously noted. Plastics are an interesting addition and work on them is progressing. The average pattern shop will not adopt plastics until such time as their usage entails little or no technical chemistry knowledge. Advantages, no doubt, will be many, with duplication of patterns to highly accurate tolerances being very important. Resistance of plastics to foundry heat, sand moisture and abrasion are regarded highly. Recently developed plastics lend themselves to easy patching

and buildup and are machined readily. Impregnated hardwoods are a development recently made public and no doubt are a by-product of plastic research.

In closing, a word of commendation should be said for the pattern supply houses engaged in progressive, worthwhile research problems.

Trend in Die Castings Is To Larger Sizes

By J. C. FOX
Die Casting Consultant
Toledo, O.

COMMERCIAL DEVELOPMENT and production of die castings has passed its fiftieth year. In that time much progress has been made in the quality, diversification of applications, and tonnage of die castings, and in the die casting machine, in steel for dies, in alloys and in casting technique.

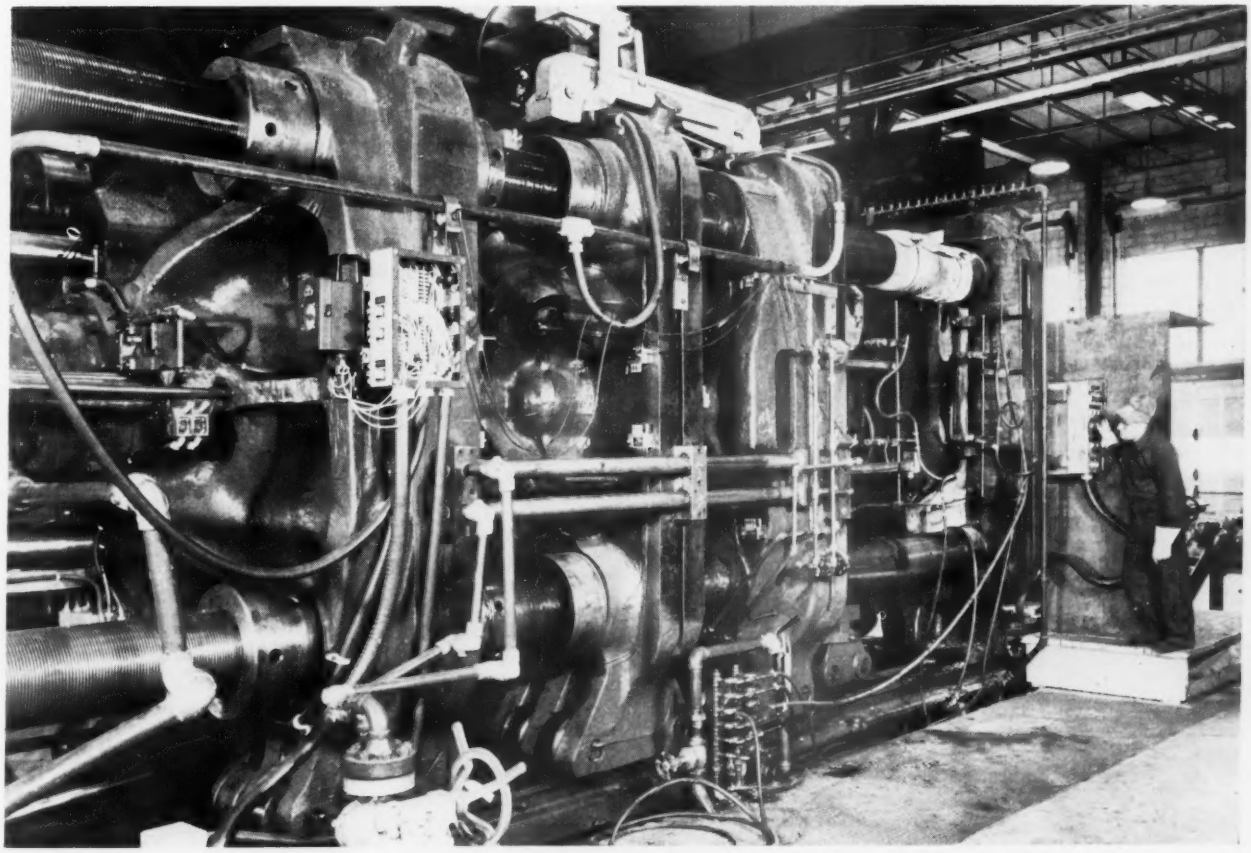
In 1900 only a few companies were producing die castings of tin, lead and zinc base alloys, and these in an empirical way. Today 800 companies produce die castings.

Since about 1930 when high purity (99.99%) zinc metal was developed, zinc alloy die casting production has increased steadily. In 1954 about 450 million pounds of zinc die castings were produced. Similarly, aluminum-base die castings have expanded in tonnage and applications, some 225 million pounds being produced last year.

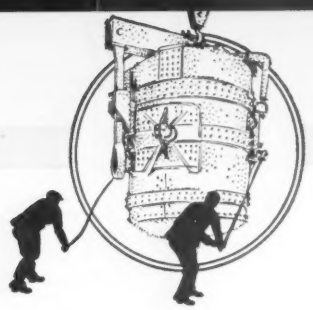
Today there is a trend toward production of larger and larger die cast parts. As the casting size increases, problems relating to successful production multiply. Casting machines must be larger, alloys stronger and better die materials must be provided for the larger castings. To indicate how large die castings are becoming, one producer has a die weighing about 28 tons. Naturally the casting machine must be of sufficient size to accommodate such a die.

Although zinc-base die castings are used in the greatest quantity for automotive construction, the use of aluminum-base die castings in this field is rapidly expanding and there is a notable increase in their use in other industries. Aluminum die castings are found in automotive transmissions, power steering, power brakes and similar new automotive devices. One make of car utilizes over 50 lb of aluminum die castings per car in transmission parts alone.

Although considerable technical progress has been made in the die casting process, there are still a number of outstanding problems yet to be solved. There is a need for a better casting machine and



Die casting machine at Doehler-Jarvis Div. of National Lead Co., Toledo, O., weighs 2000 tons, can handle 50-ton dies and make 75-lb aluminum castings



casting technique, one which will produce die castings, especially of the lighter metals, which will be sounder and of greater uniformity, than the present process affords. Production is needed of internally sound castings capable of heat treatments to enhance mechanical properties and capable of taking finishing treatments not possible with the present practice; as for example, vitreous enameling of aluminum castings. The writer is sure that these requirements can be met, having produced sound aluminum castings experimentally.

There is a need for better die casting alloys, especially those of aluminum and magnesium-base, for higher mechanical properties as cast and for greater corrosion resistance. While present die casting alloys have fair properties, and have given satisfactory services to date, it is recognized that for large and highly stressed structural parts, higher strength alloys, particularly those with higher yield strengths, will be mandatory.

Research now being conducted must be continued and expanded on the development of better die materials, particularly for die-casting the higher melting point metals and alloys, such as brass and other copper-base alloys.

Lubrication of dies also is important. Its prime function is to form a tenacious, adherent film on the die impression surfaces to prevent direct contact of the molten casting alloy with the steel die. Lubricants also are used for lubricating moving parts of a die, cores, ejector pins and slides to prevent their sticking and galling in use. Improved lubricants are a must for the production of better die castings and also for their influence on die life.

In the future it is easy to see a greatly expanded and fully automatized die casting industry, producing die castings in aluminum, magnesium and titanium and improved alloys of these metals containing as yet unexplored elements, even in trace amounts.

Investment Foundries Stress Quality Control

By TED OPERHALL
Misco Precision Casting Co.
Whitehall, Mich.

TODAY there are over 100 foundries producing investment castings. A recent survey made by the Investment Casting Institute indicates that approximately 10,000 employees are employed by investment foundries, utilizing 1,250,000 sq ft of production area. The estimated dollar volume of production of these combined companies is in the range of $106 million per year.

The largest single industry served by the investment casting process is comprised of aircraft power plant companies. Others, in order of importance, are electronics, aircraft instruments, food equipment and machinery, business machine, aircraft airframe, nonaircraft instrument, pump, and textile industries. Gas turbines were a natural outgrowth of turbo super-supercharger components, and the turbine blades produced back in the early 40's now have increased in size and complexity, but the basic metallurgy requirements for high temperature applications still remain.

The investment casting process lends tremendous latitude to the design engineer, both from the design standpoint and in the selection of alloys. Investment casting producers, however, have been confronted with new problems for producing a specific casting shape. Consequently they have equipped themselves with facilities to control and meet the specifications of a high quality investment cast product.

This includes x-ray, chemical laboratory, Zyglo facilities, an inspection department with optical comparators, guillotine gages, profilometer, and all the necessary equipment required to qualify the dimensional characteristics of a component. Additionally, a process control laboratory, so necessary in controlling uniformity of castings, is available. In fact, every facet of control is utilized to insure casting uniformity, and operation sheets cover every stage of production. Raw materials, including waxes, sands, grog, binders and metals, are checked for conformance to specifications before being used.

Temperature and humidity control is an important factor in dimensional reproducibility. The wax department, through to the point at which the expendable patterns are invested, is air conditioned. Investments are checked for expansion characteristics, and crushing strength is tested for each newly prepared batch of binder.

The investment casting industry recognizes that it is still in its infancy, and formed the Investment Casting Institute to disseminate technical know-how among investment foundries. The industry casts components to micrometer tolerances and exacting metallurgical requirements. Consequently there is an extremely high casting rejection rate. The industry feels that only by a free exchange of technical data can current rejection levels be reduced. Technical committees have been formed to study metal specifications, dimensional tolerances, and process material standards, in an effort to establish uniformity in the industry. Also by planning and working together to provide users with

realistic performance abilities, members of the industry believe they can create greater demand for their products.

Within the next five years, the industry anticipates a wider use of investment castings in gas turbines. Modern investment foundries are investigating vacuum melting equipment which can be put into semiproduction operations in the hope that alloys which do not require strategic metals can be used. Air-cooled engine components also are being studied. Because of the complexity of configuration and cooling channels of those parts, it is expected that they can be produced as investment castings.

MELTING

in basic-lined cupolas and the use of hot blast systems have had strong influence on cupola practice. Closer melting control and better operating economy are among the benefits. Vacuum melting is "just around the corner" for the foundry industry

Basic Linings Permit Better Cupola Control

By CHARLES K. DONOHO
American Cast Iron Pipe Co.
Birmingham

BASIC REFRACTORIES in metallurgical operations are essential in order to make use of basic fluxing reactions with the molten metal. Basic fluxes and slags may be desulphurizing, dephosphorizing, deoxidizing, and effect high alloy recovery.

Basic cupolas offer special advantages which are causing a sharp increase in their use in foundries. Considerable desulphurization can be carried out conveniently within the basic cupola, either to produce higher quality iron, or to permit the use of cheaper grades of melting stock. Dephosphorization is possible but impractical because the oxidizing conditions required cause loss of valuable manganese and silicon. A higher degree of deoxidation can be attained with the low FeO content basic slags. As regards alloy recovery, there are disadvantages as well as advantages. Loss of the acid element, silicon, in the basic cupola may be as much as double that normally experienced, but manganese loss is reduced considerably.

A less obvious effect of basic cupola melting is the considerably increased absorption of carbon from the coke. This permits high carbon irons to be obtained conveniently, or, alternately, higher proportions of steel scrap can be used in the charge. With high basicity slag, low phosphorus irons with normal carbon content can be produced by using up to 80 per cent of steel scrap in the charge.

The basic cupola has been found to be an ideal medium for producing a base iron most suitable for treatment to form nodular iron. The low sulphur and oxygen content obtained in basic melted iron increases the efficiency and the recovery of magnesium and other nodulizing agents. Low phosphorus and relatively high carbon content also is desirable in nodular iron. Probably most of the recent, new installations of basic linings in cupolas have been for nodular iron production.

Many of the early basic cupola linings were of magnesite brick, but dolomitic refractories have been found to be as effective and considerably more economical. Suitably bonded granular dolomite can be blown conveniently on the cupola wall with a cupola lining gun. Breasts and troughs are rammed with dolomitic ramming mixes. Carbon or graphite blocks have been used to resist basic slag erosion. Slag knives or skimmers can be made with magnesite brick.

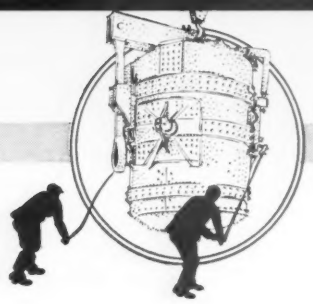
As gray iron metallurgy progresses there is increased accent on controlled metal quality. This undoubtedly will cause increased employment of basic cupola practices.

Many Benefits Offered By Cupola Hot Blast

By GARNET P. PHILLIPS
International Harvester Co.
Chicago

EACH YEAR more foundries are preheating cupola blast air. The trend in use of hot blast seems to be toward higher blast temperatures of about 800 to 1000° F, although present practice generally is in the range of 350 to 600° F. With increasing temperatures of the preheated blast, lower oxidation losses of iron, manganese and silicon are experienced up to 900° F, when the silicon loss becomes nil. Still higher blast temperatures have resulted in silicon pickup through reduction.

Hot blast can result in coke economy, higher



metal temperatures, faster melting or a combination of all three. Perhaps the main reason for installing a hot blast system is to save fuel. Use of a hot blast of 500° F can cut coke consumption with a corresponding reduction in limestone and with no drop in metal temperature. Other advantages include a reduction in refractory cost, lower sulphur pickup, less oxidation of silicon and manganese and improved cupola operation due to the chilling of slag at the tuyeres being practically eliminated.

The two basic types of hot blast systems are the recuperative and the externally fired types. The recuperative type uses the sensible and latent heat of the cupola effluent gases to preheat incoming air. The externally fired type uses an independent heater to preheat the blast air.

Both types of hot blast systems have advantages and disadvantages, as follows: Only enough purchased fuel to burn a pilot light is required by the recuperative type. The externally fired system must use purchased fuel. Frequent cleaning of the recuperative type is necessary. Cleaning and maintenance are less for the externally fired types.

Up to an hour from the start of the cupola, heat is required for recuperative types to attain peak performance whereas independent preheating of the external type allows the desired temperature to be reached from the start of the heat. Less fluctuation is experienced in blast temperatures when using the externally fired system. Fly ash and cinder emission are reduced in the recuperative system. Installation and maintenance costs are lower for the externally fired systems.

Main differences among various makes of recuperative systems are in the construction of the combustion chamber and the heat exchanger. From 60 to 100 per cent of the effluent gases are used. Generally, a separate combustion chamber is provided, although in some instances the upper part of the cupola is used as a part of the combustion chamber. One, two or three heat exchangers may be used. Arrangement and size of the tubes in the heat exchanger varies.

Some systems circulate the effluent gases inside the tubes and preheat the air on the outside; other systems reverse this procedure. In either case it is necessary to remove any accumulation of soot which would lower the system's efficiency.

Countercurrent heat exchangers are used in the various externally fired systems. Incoming blast air is passed inside the tubes. In case of a cupola shutdown the preheated blast air may be vented to the atmosphere.

Intermediate vacuum melting units are simpler than the laboratory equipment illustrated here

New Frontier Is Opened By Vacuum Melting

By WILLIAM S. PELLINI
Naval Research Laboratory
Washington

VACUUM MELTING and casting is not new; the technique has been used on a small scale for the production of "problem" metals for many years, and laboratory size equipment (50 to 200 lb of steel) became relatively common after the war. At the present time, equipment of this type is a "must" for foundry research laboratories. Such a research unit is in use by the Naval Research Laboratory experimental foundry. The movement to industrial size units is a new development of recent years and one which deserves the attention of foundrymen. Units which cast as much as six, 1000-lb heats without breaking the vacuum are in use. While the maximum size of vacuum furnaces, today, is in the 2000-lb range, plans for building 5000-lb and even 10,000-lb units have been advertised.

High vacuum furnaces require massive equipment, involving a system of mechanical pumps which back up ejector type booster pumps and which in turn back up high capacity diffusion pumps. The complexity and size of the system depends on the job to be done. The higher the vacuum required and the larger the pumping capacity determined by outgassing characteristics, the larger and more complicated the system. The picture of massive installations required for handling problem metals, no doubt has discouraged foundrymen from thinking in terms of applying

vacuum to foundry use. This mental block has prevented consideration of what may be done with intermediate vacuums requiring only simple installations and inexpensive mechanical pumps.

A milestone in the use of vacuum for practical foundry operations was passed in 1954 with the development of an inexpensive unit for vacuum degasification of nonferrous melts. The method, described in FOUNDRY, December, 1954, provides for positive removal of gases from the liquid metal and has been demonstrated to eliminate pinhole porosity in aluminum castings and to improve pressure tightness of copper alloy castings. It is now used in various foundries with excellent results as predicted by initial laboratory studies. Mechanical properties are improved; increases of approximately 10,000 psi in the tensile strength and doubling of tensile ductility values have been obtained with specimens cut from gun metal castings. There is no doubt that other applications of intermediate vacuums will be found for foundry operations, as have been found by other industries, notably the chemical and food processing industries.

Much attention has been directed to the use of vacuum melting and casting for high strength steels. Remarkable increases in the fatigue life of bearings have been obtained by the high cleanliness characteristic of vacuum melted steels. The amount of nonmetallics present in steel may be cut by a factor of 10 by vacuum induction melting. Hydrogen, which limits the usefulness of ultra-high strength steels may be reduced from a normal 5 to 8 parts per million present in open hearth melts at tap, to less than 1 ppm by vacuum melting. Many high temperature alloys containing easily oxidized elements must by necessity be melted and cast in high vacuum systems.

Today's specialty metals such as titanium, zirconium, tungsten, molybdenum, ductile chromium, ductile vanadium, uranium, and their alloys are being developed with the realization that these will be common metals in tomorrow's nuclear power age. Foundry operations concerned with these highly reactive alloys will be far different from today's operations for the common metals. It is not at all futuristic to look ahead to foundries consisting of neat rows of automatized vacuum melting and casting units. Vacuum melting and casting operations are "just around the corner" for the foundry industry.

METALS

for foundry use have grown with new alloys and the application of improved techniques with older ones. Fields of use for pearlitic malleable and ductile iron continue to expand. A bright future is seen for use of titanium in production castings

Aluminum Casting Work Has Many Advances

By FLOYD A. LEWIS
Aluminum Association
New York

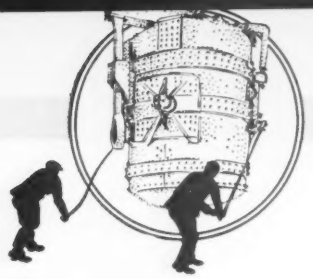
GREATEST DEVELOPMENTS in casting aluminum alloys have been in the mass-production methods—permanent mold and die casting, particularly the latter. Die castings in 1954 accounted for about 38 per cent of total aluminum casting production, compared with 32 per cent in 1952; and permanent mold castings comprised 35 per cent of the 1954 total compared with 28 per cent in 1952. At the same time, sand castings dropped from 38 per cent of total production in 1952 to 26 per cent in 1954. Other casting processes, important for certain applications, still account for less than 2 per cent of the total.

Because aluminum alloy die castings provide good physical and mechanical properties at low cost, an increasing proportion of total die-casting production is being turned out in aluminum. This is particularly true in the automotive and portable equipment fields where light weight also is advantageous.

Maximum size range for aluminum die castings has been extended to 75 lb with the development of a new 72-in. 2000-ton die-casting machine. Aluminum die castings of this size can be produced at the rate of about 30 per hour. Since hand pouring is not feasible for castings of this size, a mechanically operated, electrically heated, pouring ladle is employed. In fact, the entire machine operates automatically. The machine was developed primarily to produce parts for the automotive industry and experiments already have been made on the die-casting of aluminum engine blocks. Other possibilities include rear deck lids, instrument panels, door frames and other large units.

Another development that is expected to stimulate further use of aluminum die castings is an improved surface which simplifies finishing. A "hardware" class of finish now can be produced so that the parts may be chromium plated without expensive mechanical finishing.

By a production adaptation of centrifugal action,



some types of permanent mold castings now can be produced with a grain structure even finer than the good structure normally produced by this method. Better filling of molds, closer dimensional tolerances and higher surface quality are among other advantages. The method is particularly useful where the higher mold cost can be offset by a reduction in machining of the casting.

So-called precision sand casting has received considerable attention in recent years. No new methods are involved, only close control of foundry variables. Under some circumstances and with careful workmanship by highly skilled craftsmen, precision sand castings can be produced that are almost the equal of permanent mold castings.

With the introduction of permeable plaster molds, a new milestone has been reached in the plaster casting process. First developed on a large scale to produce the intricate bladed castings required for automotive torque converters, the process now is being applied more broadly. Some torque converter parts are being produced in permanent molds with permeable plaster cores. Although shell molding has progressed materially in recent years, it still has limited use in aluminum casting.

Production of high-frequency wave guides, which require high precision, is accomplished by precision investment casting, using a frozen mercury pattern. This is coated by repeated dipping in a slurry of refractory oxides at low temperature. The thin-walled mold which is formed has sufficient green strength to permit handling to convert the pattern to its original liquid state by pouring liquid mercury over the frozen sprue. Dimensional tolerances of $\pm$ 0.005 in. per in. or better are said to be possible on small parts with this method.

Automation, which has hit so many other industries, also has invaded the aluminum foundries. While the opportunities are not so great here, many foundry operations are being mechanized, especially in permanent mold and die casting shops where automatic operations may be employed more readily.

Fractured test bar, poured in a large gray iron foundry, is shown being examined for chill depth

Developments in Copper Alloys Are Widespread

By JAMES S. VANICK
International Nickel Co.
New York

METALLURGICALLY, advancements in copper-base alloy casting probably should come in melting equipment, although today's metal is melted cleaner, hotter and treated better than in the past and much progress has been made in handling higher melting point metals.

Notable progress has been made in the design and standardization of copper-base alloy test bars as well as in the use of chill test fracture blocks for gaging metal quality. Unfortunately, these tests usually are used after trouble has been encountered and not before.

The British Non-Ferrous Metals Research Association proposal to apply aluminum wash to molds for tin bronzes is receiving attention. The use of pitch bonded facings for improving soundness in leaded tin bronzes also is being studied. Plastic-bonded sands similarly are under observation. Keeping in advance of this progress, foundrymen's associations, both technical and commercial, have done much to encourage application of control tests in the foundry to establish quality of metal prior to casting plus additional tests to establish quality control.

Impregnation of pressure castings with sealants such as plastics or resins to correct minor leakage defects deserves the co-operative support of consumers and producers.

Castings produced from copper-base alloys can be divided into five groups: Constructional group —88-10-2, pressure castings—85-5-5-5, bearing metals—80-10-10, yellow brasses—15 to 40 per cent Zn, and miscellaneous—manganese, silicon and aluminum bronzes and nickel alloys. Within each of these groups, a dozen modifications occur in which the percentage of each alloy ingredient is subject to change.

Relatively few changes have been made in the

first four classes. Among the bearing metals, the copper-antimony-lead alloys of the following type (10 Pb, 8 Ni, 1 Sb, 1 Zn, 0-2 Sn, balance copper) have been lying dormant and deserve more attention. They are cast and machine easily. At high speeds and light loads they resist seizure and wear as well or better than the traditional 80-10-10 and do so for less cost.

Modifications of the major alloys generally, have been brought about through unavailability of certain ingredients or, conversely, through abundance and low cost of other ingredients. The situation has invited a downgrading of specifications to the point where satisfactory performance is risked. The risk will not be eliminated until the innumerable alloys have been re-examined and restudied from the standpoint of their long-term performance, and specifications written that can assure desirability and adequate performance.

Attempts to standardize copper alloys have had some success, but 10 to 20 per cent still remain in the miscellaneous group, which merits considerable attention. It is within this group that most recent progress has occurred. It is reasonable to expect that most future progress will develop there also.

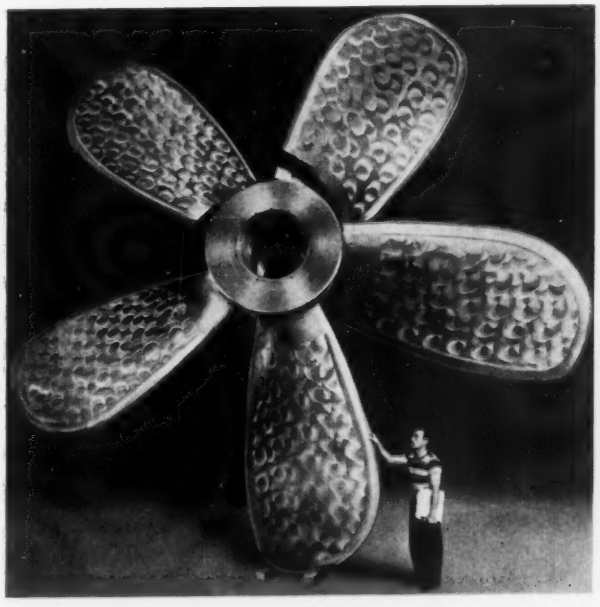
Recent practice of increasing tin and nickel contents in many copper-base alloys is improving corrosion and wear resistance.

Manganese and aluminum bronzes have been improved, but the aluminum bronzes have attained a greater degree of advancement. Laboratory tests have shown advantages of aluminum bronze but it took a recent crisis in propeller materials to promote its use for propeller castings. In the process, existing aluminum bronze specifications were modified to employ less aluminum and iron and more nickel and manganese. The resulting product in the as-cast condition develops high strength and ductility plus high corrosion-resistance.

Silicon bronzes are open to similar advancement. Progress already is being made on improving their density, toughness and weldability and reducing their susceptibility to porosity.

The cupro-nickels have passed through a period of readjustment in the course of which the 70 Cu-30 Ni bellwether of the flock has been supplemented with the 80-20 and 90-10 varieties.

Nickel-silver alloys have suffered from debasement during the past decade. Prevalent specifications include compositions of 10 to 20 per cent nickel which increases corrosion resistance and should restore the high standing of the alloy for plumbing goods and household hardware. At one time it was used extensively in the ornamental architectural fields and its continued use as Pullman car hardware should help restore its use in those fields.



This 30-ton cast nickel-aluminum bronze propeller for an ocean going vessel is 21 ft in diam

New Magnesium Alloys Facilitate Casting

By DR. T. E. LEONTIS
Dow Chemical Co.
Midland, Mich.

THE MAGNESIUM foundry industry has made great strides since World War II in developing techniques for producing high quality, intricate castings required by the rapidly growing aircraft industry. An important recent advance in foundry technology is the development of techniques for producing thin-wall castings with good surface quality to replace fabricated and welded parts.

Also, during the last few years emphasis has been placed on developing new alloys. These reduce the foundryman's problem of casting complicated engine and airframe parts with a high degree of soundness and with reproducibility of properties within a casting and from casting to casting.

Recent developments have led the industry back to alloys in the Mg-Al-Zn system having lower Zn content. These approach the original compositions used by the magnesium casting industry in this country 25 to 30 years ago and which have been in continuous use in Europe. The two favorite alloys in this country for many years have been AZ63A (6 Al, 3 Zn, 0.2 Mn) and AZ92A (9 Al, 2 Zn, 0.2 Mn), both of which have been performing satisfactorily in a wide variety of applications.

The more recently introduced compositions, AZ91C (8.7 Al, 0.7 Zn, 0.2 Mn) and AZ81A (7.6 Al, 0.7 Zn, 0.2 Mn) exhibit less tendency toward microshrinkage than alloys containing higher Zn. AZ81A is easier to heat treat, particularly in castings having heavy wall thicknesses. However, AZ92A in the solution heat treated and aged temper (T6) is still favored for applications requiring high strength. AZ91C is recommended for use in the solution heat treated condition (T4) and in the

solution heat treated plus aged condition (T6) whereas AZ81A is recommended only in the T4 temper. AZ81A is the most stable Mg-Al-Zn alloy used in the T4 temper. The benefits of AZ91C and AZ81A have been realized without sacrificing fatigue strength or creep resistance and with an additional advantage of improved weldability over AZ63A.

Up to now the majority of applications for magnesium castings have been military. The development of these more easily castable alloys may well accelerate the anticipated and desired expansion of the magnesium casting industry into the civilian market. Future research and development undoubtedly will yield more alloys which should improve the industry's position in this respect.

For use at elevated temperature, several Mg-Th-Zr alloys have been gaining acceptance. These alloys offer a considerable advantage over the older magnesium-rare earth metal-zirconium elevated temperature alloys in that they are capable of withstanding much higher stresses at 500 and 600 F. Prototype castings have been made and the next few years should see a significant increase in the importance of these alloys.

Continue Research on High Alloy Steels

By C. K. LOCKWOOD
Stainless Steel & Alloys Div.
Shawinigan Chemicals Ltd.
Montreal

THE TECHNICAL development in cast high-alloy steels that has been packed into the brief span of 25 years, parallels in achievement great technical advances made in other fields in the same period. This rapid progress has been two pronged. Firstly, the metallurgical advance in producing alloys that would stand severe corrosion to strong acids or resist oxidation at high temperatures, and, secondly, the ability to produce these alloys as sound castings of intricate shapes.

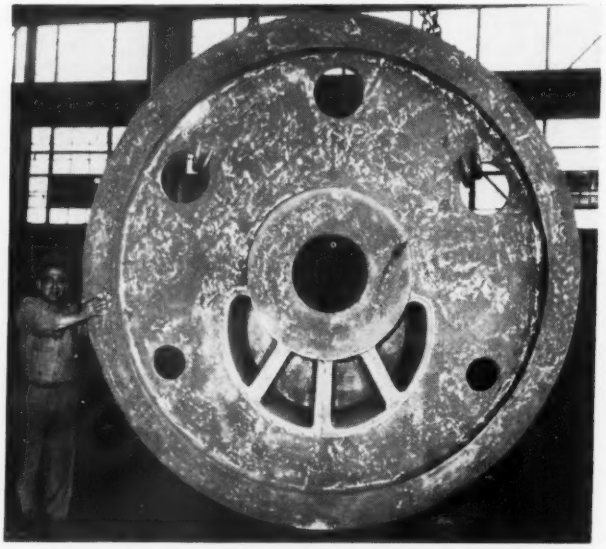
About 1936 a group of alloy casting producers in the United States formed the Alloy Casting Research Institute, later changed to the Alloy Casting Institute. This research-minded group placed contracts with various metallurgical laboratories and instigated programs which have given industry, today, much of its knowledge of high alloy cast steels. These steels now may be used with confidence and assurance that the best composition has been selected for the application which is desired.

Many of the generally accepted ranges of alloy steels have been known since stainless steels first were introduced commercially, but the research efforts of the Alloy Casting Institute have been directed to determine the best alloy limits for the various grades. Perhaps the outstanding example of this type of research was the work done by Harder and Gow at Battelle Memorial Institute on balancing the composition of the 25 per cent Cr-12 per cent Ni heat resistant grade.

Other research programs undertaken by the Institute include: 1. Exhaustive studies on the straight chromium grades. 2. Influence of additional elements and heat treatment of the 18-8 alloys. 3. Effect of mass and section thickness on heat treatment of the 18-8 alloys. 4. Work on thermal fatigue testing of heat-resisting alloys. This vast amount of technical information has been condensed into data sheets covering the corrosion resistant grades and a further set covering heat resistant grades will be published shortly.

Present studies include behavior of stainless steels under high temperature and pressure conditions and development of a stainless steel with high strength and high hardness, coupled with good corrosion resistance. The program also includes an investigation of the physical properties of corrosion grades at intermediately-high temperature ranges to determine whether they may be used in mild heat-resisting applications.

Independent manufacturers also have been active on their own research programs and many new useful grades have been developed, such as the FA20 alloy for use under sulphuric acid conditions, the NA22H alloy for high strength at high temperatures and V2B for high strength and hardness with



Ductile iron gear wheel, weighing 29,000 lb, was cast at Cooper-Bessemer Corp., Grove City, Pa.

an accompanying good resistance to corrosion.

Probably the outstanding development in stainless steel alloys was the addition of molybdenum to the 18-8 grades. This, more than any other fact, extended the usefulness of this material to a point where it is universally accepted as the most important corrosion-resistant grade.

Along with the metallurgical developments, parallel advances have been made in foundry techniques. The advances that have been made generally in the founding of metals apply equally to stainless steel. These include centrifugal casting methods in both sand-lined and permanent molds, shell molding techniques and general mechanization, to mention only a few. Probably the most important achievement in stainless steel melting practice has been made through the use of oxygen. By blowing it into the molten steel in an arc furnace, high-quality, low-carbon grades can be produced readily. Prior to this, these special grades were feasible only in an induction furnace using virgin materials.

Expanding Usage Marks Pearlitic Malleable

By DR. W. K. BOCK
National Malleable & Steel Castings Co.
Cleveland

PEARLITIC MALLEABLE iron has grown in recent years from a minor product of the malleable foundry to one which now accounts for an appreciable part of the industry's tonnage. It is used in automobiles, trucks, agricultural implements, ordnance, mining equipment, on the railroads and in other fields. And its uses are expanding rapidly.

Much of the interest in pearlitic malleable is due to its distinctive properties. The designer likes it because it gives him a wide range of mechanical properties. For example, yield strengths from 40,000 to 70,000 psi or more can be produced. The machinist likes it because it machines with remarkable ease for a medium- to high-strength metal. After the machine shop is finished with its work, pearlitic malleable can be flame- or induction-hardened. The user likes pearlitic malleable because it retains much of the toughness of malleable iron.

Pearlitic malleable does not need to be "babied," and some of its present uses demonstrate this fact. The automobile makers use it for highly stressed rotating parts of automatic transmissions. On the railroad it is subjected to stresses and impact loading in journal boxes. Rocker arms display the toughness and excellent bearing properties of this material. Its use in crankshafts indicates its strength, toughness, and rigidity.

The beauty of pearlitic malleable from the viewpoint of the malleable foundrymen is that it can be produced along with malleable by slight modification of his process. The base metal for both malleable and pearlitic malleable is white iron. The heat treatment is the same for both, up to the end of the first stage or high temperature graphitization. From this point, malleable iron is cooled slowly and pearlitic malleable is cooled rapidly. A tempering treatment completes the heat treatment of pearlitic malleable.

Field For Nodular Iron Continues to Grow

By THOMAS E. EAGAN
Cooper-Bessemer Corp.
Grove City, Pa.

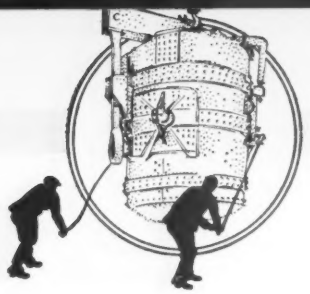
TONNAGE of nodular iron used continues to increase. This can be attributed to the fact that favorable experience has encouraged engineers to specify it. All new materials must undergo extensive field testing which takes considerable time. When this testing period is over and confidence has been acquired, a demand usually is built up. This is true of nodular iron, and its future seems very promising.

Agricultural, heavy machinery, and electrical industries now take the bulk of the material produced. Adoption of ductile iron in those industries has taken place after extensive field tests. In some cases it has replaced cast steel, chiefly because of its lower cost, ease of casting, and better machinability. Today, however, designers are using it as another member of the family of ferrous materials which has its own special qualities.

Foundries continue to improve their ability to produce nodular iron of extremely uniform quality. No longer is there any doubt as to whether the material produced is nodular iron or gray iron because newer methods of treating the iron and newer alloys always develop the desired spheroidal graphite structure.

Methods of eliminating cope side deposit, or dross, have been developed. Experience has shown better methods of gating and risering which insure solidity.

The interest in nodular iron is reflected by the amount of published research data. The Naval Research Laboratory has shown the material to have good shock resistance, provided it has the proper chemical composition and is given the proper heat treatment. This work also shows it to act very much like steel as far as low temperature embrittlement is concerned. This same laboratory has contributed through FOUNDRY (June, 1954) an outstanding contribution on the solidification and feeding characteristics of the material. A number

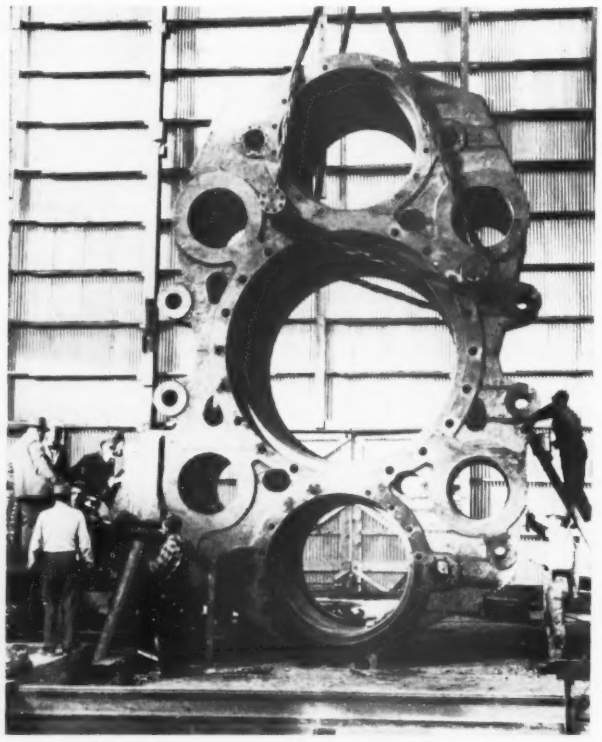


of papers on elevated temperature properties of the material have shown it equal to the lower carbon steels as far as creep rate is concerned. This characteristic is being exploited in such things as furnace doors and other furnace parts.

Nodular iron usually is considered in the as-cast, or ferritized annealed state. Lately, the normalized, air quenched, and tempered condition has been used for applications where the other two conditions are not suitable, either because of lower hardness, or lower physical properties. One use of these grades has been for gears. After additional experience is gained there is little doubt that a specification covering them will be issued. In fact, the ASTM committee now is considering one.

Specifications for nodular iron continue to be a problem. The ASTM specification A339-51T recognizes only two grades of material; namely, an as-cast grade (80-60-03) and an annealed grade (60-45-10). This is true also of the AMS specifications: Namely, AMS 5316 and AMS 5315, respectively. Many company specifications have six grades which cover all types of material. The Navy specification recognizes one grade, while the Army Ordnance specification has six grades. The SAE is studying a specification for automotive work.

One of the important uses of nodular iron could be for unfired pressure vessels. This is prevented by the ASME Boiler Code unless special dispensation is secured. As a matter of fact, there is one autoclave now in service under special dispensation of the Ohio Industrial Commission. The Code Committee recently has appointed a subcommittee to consider including nodular irons in the code and on what basis it will be accepted.



Cast steel forms this cylinder housing used in a 14,000-ton press for extruding aluminum parts

Bright Future Is Seen For Titanium Casting

By R. E. EDELMAN
Pitman-Dunn Laboratories
Frankford Arsenal
Philadelphia

TITANIUM casting has taken giant strides in the past few years. From castings weighing a pound or two, the technology has developed to the extent that shaped castings weighing approximately 70 lb now are being made.

Basic difficulties which have prevented the successful economical casting of titanium have been:

1. The inability to obtain a pool of molten metal large enough to fill the mold cavity, gates and risers of larger castings;

2. A method of pouring which would insure that enough hot, uncontaminated metal would reach the mold cavity quickly;

3. A mold material which would not contaminate the melt and would not produce a drastic chill surface.

All of these problems have been attacked by many government and industrial research units. One government installation has developed a furnace capable of making shaped castings weighing approximately 70 lb. This unit not only makes large, uncontaminated titanium castings but also increases the yield of useful metal from a given charge. In addition, since a consumable electrode is used and the melting takes place in a vacuum, the highest chemical quality is obtained. This high metal quality is essential if the maximum ductility of titanium is to be obtained.

The method of pouring, the geometry of gates and risers, and the science of feeding have been studied extensively to ascertain the best pouring arrangements. One of the new approaches has been to centrifuge the molten metal into the mold. This method is advantageous in that it minimizes the amount of superheat required and provides sufficient force from the centrifugal action to fill small sections which would be extremely difficult to produce by static casting.

A considerable amount of research has been carried out on mold materials for casting titanium. Up

to now, no mold material has been found which is suitable for all section sizes of titanium. Some mold materials, however, are satisfactory under certain limited conditions. Machined graphite still is used predominately to produce uncontaminated castings. Although it is doubtful that an ideal mold material will be developed in the near future, research is continuing on methods to correct this situation.

The future looks brighter for the production of titanium castings, within the framework of the over-all titanium program, than it has at any time in the past. New developments are taking titanium casting out of the laboratories and putting it in closer reach of industrial shops.

The opinions expressed in this paper are those of the author and are not necessarily endorsed by the Department of the Army.

HEAT TREATING

techniques for nonferrous and ferrous metals have been improved and are more widely used to obtain better casting properties. Effects of melting control and casting design on heat treating results are getting more attention

Steel Heat Treatment Develops Properties

By CLYDE B. JENNI
General Steel Castings Co.
Eddystone, Pa.

MUCH PROGRESS has been made in producing quality steel castings in recent years. This has been achieved by the application of sound engineering design, scientific approaches to foundry techniques and the use of steel compositions properly heat treated to develop the combination of mechanical properties desired for the required engineering applications.

Choice of steel composition and development of the proper metallurgical structure permits a wide latitude in strength and ductility properties of the part. This flexibility in achieving desirable combinations of engineering properties along with the ability to distribute the steel where it is required, based on stress studies, gives the designing engineer a powerful tool in producing sound steel casting designs.

Purpose of heat treatment is to relieve internal casting strains and to change the microstructure so that certain definite mechanical properties are produced. One of the most important factors in producing definite microstructures is the rate of cooling of the casting from the austenitizing temperature and the resultant transformation. The metallurgical characteristics of steel compositions used are well known by steel foundry metallurgists and suitable heat treating procedures are used and controlled so that the desired microstructures, and thereby properties, are obtained.

Much attention has been directed to furnace design and construction. In many instances continuous heat treatment equipment is used. Stress relieving and tempering furnaces of the recirculating air type are in frequent use. Instrumentation for control of furnace and casting temperatures is used. In many cases program controls are employed and the heat treatment is conducted on definite time-temperature cycles. The entire heat treating operation is carried out under competent supervision and usually under direction of the metallurgical department. The steel castings industry is cognizant of the significance of proper heat treatment control as a powerful factor in developing the desired properties.

One outstanding development of World War II was the production of cast armor chiefly for tanks and armored vehicles and also for certain naval applications. Excellent properties were developed by water quenching and tempering these castings which varied considerably in size, shape and complexity of design. The experiences thus gained have been put to good use and many steel castings now are treated so as to give excellent combinations of strength, hardness and toughness.

Use of water quenching and tempering heat treatment is advantageous in developing optimum properties from steels of low-alloy content, care being taken that there is sufficient hardenability for the section thickness involved. Successful quenching operations are dependent upon good control, proper procedures and attention to casting design.

The subject of machinability of steel castings recently has been investigated and much light has been shed on significance of the structure of the steel. In some cases great improvements in machining characteristics can be made through heat treatment which alters the microstructure.

Much attention has been given to the phenomenon of temper embrittlement. While there are many factors involved, basically the severity of temper brittleness can be influenced by the tempering temperature and the time at temperature. Generally, best results are obtained when temperatures as high as consistent with the desired hardnesses

are used with as short a time at temperature as possible. The success of the short time at temperature during tempering is causing a re-evaluation of the temperature—time cycle for heat treatments in general. Many investigations are now under way and the results that will be forthcoming soon may prove to be enlightening.

Heat Treatment of Gray Iron Is Expanding

By CHARLES F. WALTON
Gray Iron Founders' Society
Cleveland

USE OF heat treatment for gray iron castings has multiplied several fold in the past few years. The importance of this trend led to the recent publication of a manual *Heat Treatment of Gray Iron* by the Gray Iron Founders' Society. Increased cognizance of the advantages in heat treating gray iron is progressing rapidly in two particular areas: Annealing castings for even better machining, and hardening of castings for increased wear resistance.

Stress-relief heat treatment at temperatures above 1000° F is becoming increasingly popular for complex castings or applications requiring extreme accuracy. This must be done carefully and with good equipment to obtain desired results. Too low a temperature will not relieve the stresses, too high a temperature will unduly soften and weaken the iron, and the casting must be uniformly cooled in the furnace or high residual stresses can be reintroduced, thus voiding any beneficial effect.

As-cast gray iron has excellent machinability, but it can be increased materially by annealing if some sacrifice in mechanical properties is allowable. This has proven to be very practical in high production machining applications. Even in jobbing lots there have been recent examples where several times the cost of heat treating was saved in the machine shop. The increase in machinability cut machining time and allowed faster delivery of the finished product. Routine annealing is not an economical substitute for good cupola control in avoiding the difficulty incurred with occasional hard castings.

Hardening of gray iron to increase wear resistance is accomplished by surface heat treatment and by full heat treatment. Choice depends upon the size and complexity of the casting, the requirements of the intended use and the facilities available.

In surface hardening, only a 1/32 to 1/8 in. depth of metal is heated to hardening temperature either by an oxy-acetylene flame or by high frequency induction heating. The surface hardening techniques are being used mainly on small high-production parts where only certain portions of the surface need be wear resistant, and on large castings where full heating and quenching cannot be used. Appliance parts such as cams, crankpins and gears are good examples of highly successful production parts. Hardened ways which are now very common on production machine tools constitute an excellent application of selected surface hardening on large castings.

Full heating and quench hardening normally are limited to castings which will cool rapidly enough in oil to harden fully. A different approach was taken in a recent application of gray iron gears up to 2 ft in diam for a high precision machine. Due to the precision requirements it was considered best to machine the gears after heat treatment. When quenched, the gear blanks did not harden fully due to their large size but they were tempered to a uniform 270 brinell. At this hardness they were machinable and gave excellent service.

Gray iron combines excellent machinability with full response to heat treatment. This combination has provided the opportunity for many recent production economies.

Design Rules Treatment Of Aluminum Alloys

By DONALD L. LAVELLE
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Federated Metals Div.
Perth Amboy, N. J.

IN THE PAST few years, there has been little change in basic procedures and techniques for the heat-treatment of aluminum alloy castings, which have become well known and established in the industry. However, some of the lesser known treatments should be emphasized, as should also the importance of properly conducting the quenching operation which follows the solution treatment.

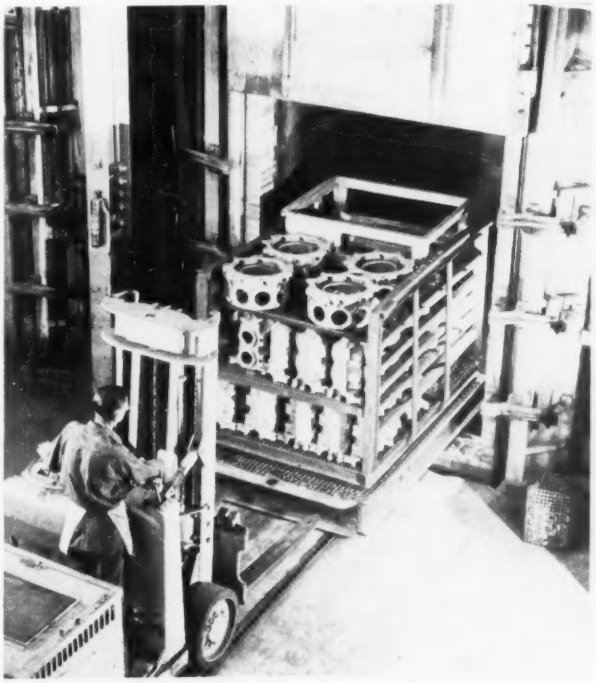
It is recognized that the best mechanical properties will be obtained by quenching in cold or room-temperature water, but the design of very few castings will permit this because of excessive warping, cracking and a high level of stresses retained in the casting. The quenching water should be in the range of 150° to 212° F to minimize these difficulties—an important point which is often overlooked.

Of growing importance is the production of stress-free or dimensionally stable castings, and it is not generally recognized that these objectives are not attained by the most widely used heat-treatment commonly known as T6, which is solution treated and artificially aged at 310° F. The solution treatment relieves all stresses resulting from the casting process, but the quenching operation can induce stresses of a very high level, at times sufficiently high to crack or fracture the casting. If these stresses are not relieved by the artificial aging treatment, difficulty may be encountered when the casting is machined because of warpage and even fracture. Also, service failures may occur when the applied load is added to the stresses present in the casting.

These troubles are obviated by utilization of aging treatments such as T7 which is at temperatures from 340 to 500° F for periods up to 9 hr. In many cases a simple artificial aging after casting is sufficient where the mechanical properties obtained are adequate for the intended use. This treatment is known as T5, T51 or T551, depending upon the alloy.

Many aluminum alloys will change in dimension slightly with time because of a change in the structure of the alloying ingredients. The change is small but in applications of precision it is important. The use of the proper heat-treatment will produce castings that are dimensionally stable. Any of the treatments previously discussed for producing stress-free castings also will give stability. Where this property is paramount, the artificial aging only usually is sufficient.

Of growing value to the industry are the relatively new aluminum-zinc-magnesium alloys which develop high strengths without heat-treatment. They are characterized by the property of naturally aging at room temperature in ten to thirty days to produce final properties. These alloys are identified in ASTM Specification B26-54T as ZC81A, ZG32A, ZG42A, ZG61A and ZG61B. Other characteristics of interest are the ability to be brazed and to be anodized with a white color, a good combination of strength and toughness, and a high degree of dimensional stability.



Aluminum castings are trucked into a heat treat furnace at Aluminum Co. of America, Cleveland

Melting Control Favors Malleable Anneal

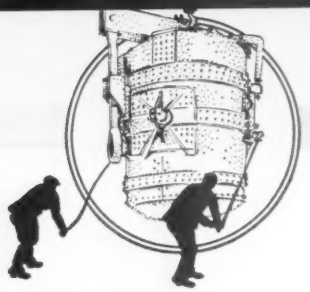
By MILTON TILLEY
National Malleable & Steel Castings Co.
Cleveland

FOR MORE YEARS than we care to admit the annealing cycle for malleable iron required about one week. This long heat treatment became so well established that it was accepted as a prerequisite. The furnaces were massive affairs of 20 to 40 tons of brickwork and were slow in heating to the first stage of anneal at about 1700° F and slow in cooling to about 1200° F in the second stage. This long, safe heat treatment covered up many irregularities in melting practice and no doubt retarded learning about controls that are desirable in the melting process as well as the mechanism of graphitization during heat treatment.

With the advent of the enormous production required for the automotive field, attention necessarily was given to ways and means of accelerating the annealing process. Probably the most significant development was finding that graphitization in the second stage could be completed within a range of temperature of 20° to 30° F while passing through the critical range where a change of phase takes place. By reducing the ratio of weight of furnace to castings being heat treated, fast heating and cooling was attained. That with adequate graphitization by retarding the rate of cooling through the critical range along with silicon adjustments permitted cutting the time cycle to as low as around 15 hr in special cases.

With heat treating under more manipulative control, the industry was in a better position to evaluate the many factors affecting graphitization rates. For instance, it was found that oxidation rate during melting as measured by silicon loss had a decided detrimental effect and must be controlled rigidly for optimum results. The lower the rate of oxidation the better the graphitization rate. Currently, much thought is being given to the role of hydrogen, nitrogen and sulphur.

As the use of alloy steel increased, the problem of tramp alloys in the scrap used in producing mal-



leable increased. Chromium, the most prevalent alloy, is a very potent graphitization retarder. Fortunately it was found that the addition of a few thousandths of one per cent of boron furnished an appreciable increase in graphitization rate in the second stage without affecting the undesirable graphitization during freezing as cast, thus counteracting the effect of chromium.

Of considerable significance is the broadening application of pearlitic malleable in recent years. Pearlitic malleable is a combining of some desirable steel-like properties with the valuable casting properties of malleable iron attained by controlled heat treatment. Its use has grown tremendously in the past few years, being applied in automotive fluid drives, differential parts, rocker arms, crank shafts, chain links, railroad journal box adapters, and other parts.

Heat Treating Improves Copper Alloy Strength

By ROBERT A. COLTON
Federated Metals Div.
American Smelting & Refining Co.
Newark, N. J.

GENERAL knowledge of the heat-treatable copper casting alloys has been available for many years but in the past few years the technology of making, casting, and using such alloys has increased and improved greatly. Included in this group of exceptional materials are the aluminum bronzes, copper with tin and nickel, the chromium coppers, the beryllium coppers, the silicon coppers, and modifications of each basic type.

While all of these alloys can be and are used in the as-cast condition, their optimum properties are derived by heat treatment which usually consists of a solution treatment at elevated temperature—up to 1600° F—water quenching, followed by a precipitation hardening or aging treatment from 600° to 1100° F.

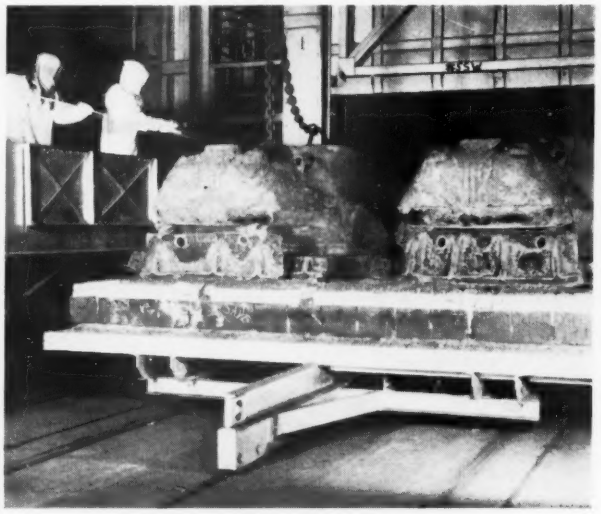
In the case of the aluminum bronzes heat treatment will increase tensile strength properties to the range of 125,000 psi. In recent years there has been increased interest in copper-aluminum alloys with nickel added which offer higher heat treated properties, better resistance to elevated temperature, and improved corrosion resistance.

Of growing importance are the heat treatable casting alloys of coper-tin-nickel-zinc. By replacing 5 per cent tin with 5 per cent nickel, the well known tin bronze, 88-10-2, which has excellent corrosion resistance, can be heat treated to improve mechanical properties. Since small amounts of impurities can suppress the results of heat treatment, these alloys necessarily are controlled strictly during manufacture and use.

The heat treatable casting alloys, copper-chromium, copper-beryllium, copper-beryllium-cobalt, and copper-chromium-beryllium have been growing in use for many years. Many of these alloys after heat treatment have high tensile strengths—up to 125,000 psi and high electrical conductivities—up to 70 per cent of copper. As so often happens, along with high tensile strength, the elongation or ductility of such materials may run very low. One to 2 per cent elongation in the tensile test is not uncommon. To overcome this potential disadvantage the newest technology in this field suggests the possibility of deliberate overaging, or use of higher aging temperatures than normally recommended. This tends to give more satisfactory ductility with some loss in tensile strength, but no appreciable change in electrical conductivity.

Recent modifications in copper-chromium and copper-beryllium alloys have included adding small amounts of beryllium, cobalt, or nickel to improve casting properties, stabilize composition, or enhance mechanical properties. Wider availability of master alloys of copper with chromium, cobalt, or silicon have made it possible for foundries to control composition of these alloys more carefully.

A new development in the field are the copper-nickel-silicon alloys developed for high strength and high corrosion resistance in the electrical industry. These alloys, just out of the experimental stage, have excellent casting and mechanical properties, and also are highly resistant to stress corrosion, cracking, and as such have been used for transformer eye bolts, connectors, and other



Two tank turret castings are being removed from one of the heat treating furnaces at the Union Steel Castings Div., Blaw-Knox Co., Pittsburgh

applications for parts subject to stress.

It should be noted that all of the alloys described have excellent corrosion resistance. In almost every case, the usefulness of the material is a function of this high resistance to corrosion expected from casting alloys of copper, coupled with other engineering properties such as good electrical or heat conductivity, high mechanical strength, abrasion resistance, and adequate castability.

TESTING

as a means of developing the proper casting design is making great strides. That, plus radiographic and visual inspection methods have raised casting quality. Biggest development in sand practice is the acceptance of control as a production tool

Industrial Radiography Aids Casting Quality

By ROYAL G. TOBEY
X-ray Div., Eastman Kodak Co.
Rochester, N. Y.

ALTHOUGH it would be untrue to claim that all recent improvements in the quality of castings have been brought about through the use of industrial radiography, certainly many foundries today would be closed if they were suddenly denied use of the casting know-how which this nondestructive testing method has provided in the last 15 years. All industries have benefited by these improved casting techniques. Jet aircraft might be singled out as being most dependent on the high quality of cast components made possible through proper application of industrial radiography.

As military and civilian needs required greater and greater strength in castings, there followed the need for increased x-ray penetrating ability. During the early '40s when casting armor plate was a problem in steel foundries, the availability of one million-volt x-ray machines greatly aided in determining proper casting techniques.

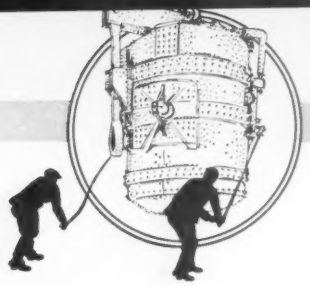
The need for cast valve bodies of unquestioned soundness again placed severe demands on foundry know-how. Such valves and fittings are essential components in equipment for nuclear reactors, and more commonly in equipment for generating high temperature, high pressure steam and for handling chemicals and petroleum. During the difficulties in Korea, the heavy castings and associated welds in Army tank structures required even greater x-ray penetrating ability. Again this need was met by the availability of new betatron x-ray generators which provided 15 to 25 million-volt x-rays capable of penetrating 10 and 12-in. steel sections in reasonably short exposure times.

In all of these applications of radiography in the foundry, there is a familiar pattern. Design engineers are more and more relying on internal soundness of castings rather than excessive safety factors to reduce the net weight of cast parts as well as to minimize man hours and machine time which subsequently must be invested before a rough casting becomes a usable component. When the foundry starts a pilot run of castings, it is common practice to radiograph most of them. Usually if casting defects are observed, their nature and location indicate what changes in casting practice will bring about an acceptable degree of soundness.

Once suitable casting technique is determined, production may be carried on with only an occasional radiographic inspection to assure that no uncontrolled variable has crept in to introduce unacceptable irregularities. Castings of so-called x-ray quality, today are well-known and purchasing agents are hesitant to accept anything less, knowing that it takes very little machining on a casting which ultimately will be scrapped to offset a few pennies more in the purchase price of the rough casting.

Although the gamma rays of radium have always offered the foundry a relatively low-cost source of penetrating radiation, the advent of artificially produced radioactive isotopes has reduced these costs still further. It is reported that there are approximately 400 such isotope radiographic sources in use in the United States, mostly cobalt-60 which is well suited for the radiography of all but the thinner steel sections. Other isotopes are becoming more generally available and each adds to the variety from which to select the source best suited to a particular casting material and thickness. Radium has been in use for 25 years, and there are now about 400 radium sources being used in industrial radiography today. Each type of source has particular characteristics which recommend it, but low-cost, easy portability and operation without external power are common to all.

It is difficult to visualize, today, the tremendous future demands for nearly perfect castings which will attend the many peaceful applications of nuclear energy. It is probably quite safe to predict that 15 years from now some of our foundries will



be producing castings with new properties and internal soundness which are unattainable today. As new alloys and new foundry techniques bring up new problems, the need for industrial radiography as a nondestructive testing tool becomes ever greater. In the past, industrial radiography has proved its ability to serve the foundry both as a development and a production tool. The needs of the future will certainly be equally well met.

Acceptance of Control Marks Sand Practice

By EARL WOODLIFF
Sand Consultant
Detroit

OUTSTANDING improvement in control of molding and core sand has been the acceptance of sand control itself. More foundrymen today have practical knowledge of the principles of sand behavior than ever before. This has been brought about largely through educational or training courses, meetings and publications. The knowledge relative to control of sand has been expanded through research sponsored by technical societies and industry. Through these co-operative efforts foundrymen are adding to their knowledge of sand and its components.

High temperature testing of sand, a fairly recent development, has revised the concepts of sand control. Through these developments have come a new class of foundry sand additives commonly known as sand stabilizers. One now stabilizes a sand's spalling tendencies in place of opening the sand and destroying surface finish. Steel foundry sands are no longer at 300 plus permeability, nor are these steel casting molds all oven-dried as was the former practice. Many large steel castings are smoother in appearance and free of surface defects thanks to high temperature knowledge of sand's behavior.

Sand selection has passed from the early stages of choice by feel. Recent trends have indicated a more stable and higher density sand can be obtained by blending two or more sands to satisfy a desired grain distribution. Demands from foundrymen have hastened greatly the improved processing of raw sands by producers. Both natural sand producers and clay free sand suppliers have found it increasingly necessary to dry and to classify their product to assure uniformity. This is enabling year 'round shipments of sand to be made, whereas only a few years ago it was a major problem to lay in a winter stock pile or receive sand frozen in transit.

Binders occupy much thinking of present day sand control men, both in their selection and use. Clay, for example, no longer is thought of only as a bond. Attention is being given to clay selection for purposes such as moisture retention, hot strength control, control of molding sand density and pH factor. Chemical treatment of clay, while very recent, is not altogether for the function of pH control for it enables control over such properties as flowability, green and dry strength and high temperature plasticity. There are strong indications of many new developments to come in this field.

Automatic moisture addition to foundry sand is a logical step in the process of improving casting quality through sand control. Weighed additions of sand and binders are being made similarly.

In the core room sand control is playing an ever increasing part. Synthetic resins are finding wider application for binders of conventional cores and shell cores and molds. Core oils today are largely a product of chemistry. Chemical driers added to core sand mixes not only have speeded core production but are useful in obtaining more complete baking of cores. Core failure and core gas have been reduced through improvements of core bind-

Magnetic particle and fluorescent dye methods are used for examining many production castings

ers. Chemical treatment of cereal binders is undergoing development. Dielectric baking has reduced considerably production time between raw sand and finished core.

Sand control covers mold and core blacking and washes, too. Quality castings cannot be assured when these coatings are made by the molder or his helper. Again the chemist has improved the final product. New micro particle size materials are used and bonds of the washes are new. They do not draw moisture back to the dried mold or core surface as they once did. New additives, in the form of wetting agents, give much greater penetration of the wash into the finer grained sands than did the former counterparts.

Design Testing Expands Market for Castings

By FRANKLIN S. CATLIN
Magnaflux Corp.
Chicago

SEVERAL very progressive foundries have developed an entirely new way of using design tests and magnetic particle tests in the last two years. With these tests they design parts which are easier to cast, lighter and more pleasing in appearance. They create and sell castings that are highly competitive with other fabrication methods, and which are lower in cost for most uses. These castings feature the many advantages inherent in castings and give castings a renewed strong appeal to those manufacturers who have shifted to other fabrication methods.

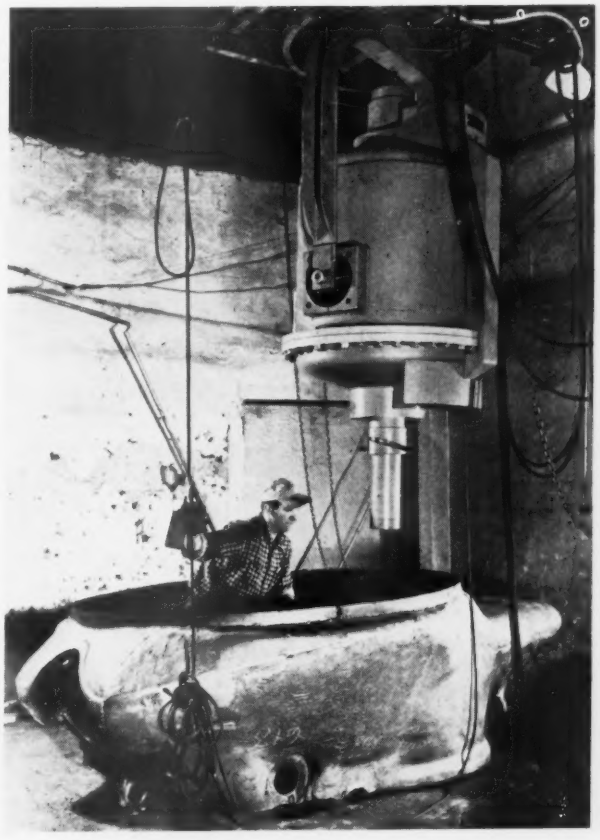
To improve a casting by design analysis, a quick test is made for the loads within the casting under its expected loading conditions. This is done in a small laboratory in the foundry, using brittle coatings to show the stresses over the entire part, and with some use of SR-4 strain gages to check stress levels. This points to redesigns for simpler and more free-flowing shapes which are easier to cast and are lighter. The castings are easier to sell, with the best casting for the intended use. The design test with brittle coatings is not highly technical nor mathematical, and the results are displayed on the part itself. These tests require some ingenuity and creative thinking by the individual, but he need have only modest technical training.

Magnetic particle testing is used as a "finger on the pulse" on causes of cracking in the foundry processes, and in handling and heat treating. A simple hand-operated testing unit equipped with black light usually is used for tests of a small number of castings out of each run during pilot pouring and during the run itself. Sample parts are tested immediately after shakeout or cleaning to locate cracking, when it first occurs. The foundryman takes immediate corrective action on the cause of the cracking, whether it be in the metal, temperature, sand, handling, or any other cause.

This new use for black light inspection in the foundry catches any trouble and pinpoints it for correction. It eliminates the old condition where entire lots of castings could be poured and heat treated only to find a high percentage cracked. When a final inspection or finish-machining showed cracks, the loss in the finished lot came out of foundry profits or resulted in higher prices for castings. With the new sampling inspection immediately after shakeout, the foundryman actually controls the quality of an entire run as it is being poured. He does not end up with intermittent high volumes of cracked castings. He does not waste spruing, heat treating, or machining time.

In steel foundries, magnetic particle and black light sampling control of castings results mainly in reduced cracking by gating and riser control. In malleable foundries the most commonly found benefit is in control of pouring and cracking in the hard iron state, and in the fact that the annealing capacity is not wasted on cracked castings.

In gray iron foundries and shops machining gray iron, the sampling tests with black light have shown a major cause of cracking in spruing, cleaning, and handling operations. This permits correction of the cause of cracking at its source, to almost eliminate cracked castings from finished lots.



Tank castings at Union Steel Castings Div. are inspected with a 1-million-volt x-ray machine

Applying finishing touches to dual-purpose wood pattern in Kaiser pattern shop. Inside forms core mold and outside forms sand mold

Large Iron Castings

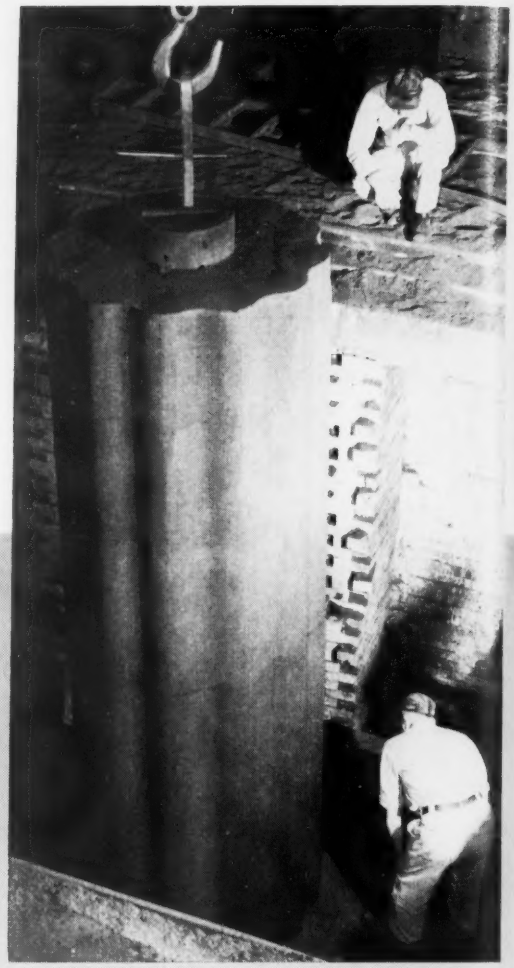
Poured by West Coast Foundry

WHEN the Pacific States Steel Corp., Niles, Calif., needed to cast extra-large steel ingots to be used for heavy forgings, they gave Kaiser Steel's Foundry Department the job of making the ingot molds.

Five molds, each weighing 72,500 pounds, were ordered. Dimensions were 44 in. ID by 137 in. high. The wall thickness tapered from 11½ in. at the top to almost 15 in. at the bottom.

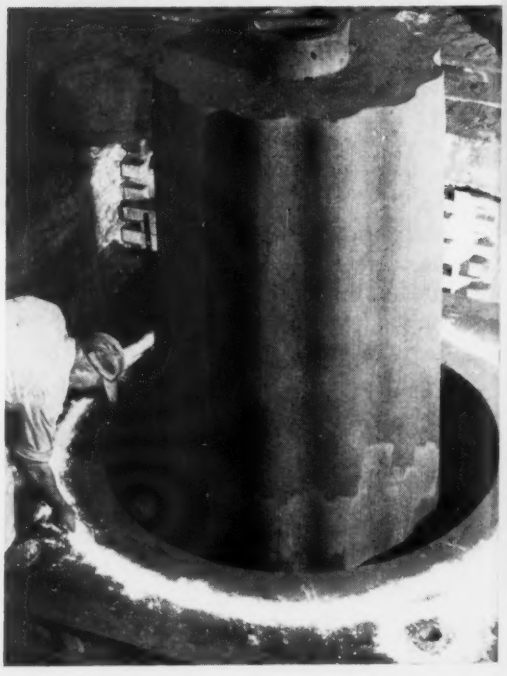
Regular molding flask equipment was used; pouring technique used two gates and two 25-ton ladles pouring simultaneously. The job was performed under the supervision of R. C. Coulson, foundry superintendent at the Fontana, Calif. plant.

In addition to serving the foundry trade, the department is regularly engaged in supplying ingot molds to Kaiser Steel's own open-hearth department of nine 225-ton furnaces, whose capacity of over 1,536,000 ingot tons of steel annually gives the company a rating as the nation's twelfth largest steel producer.



Dry sand core is lowered carefully into place. Molder checks for proper seating

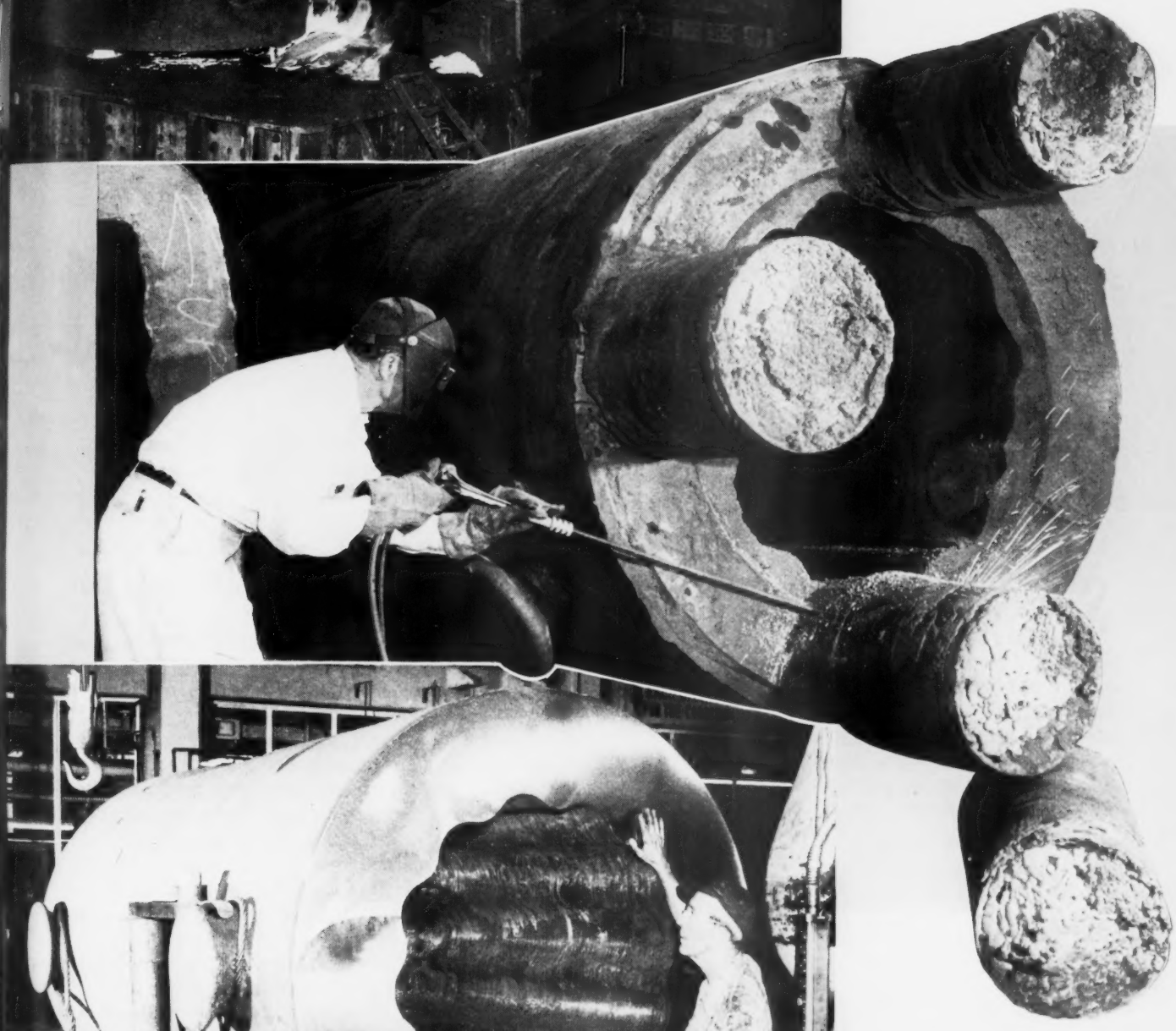
Below—Silica flour is applied to each flask section. Five sections were used

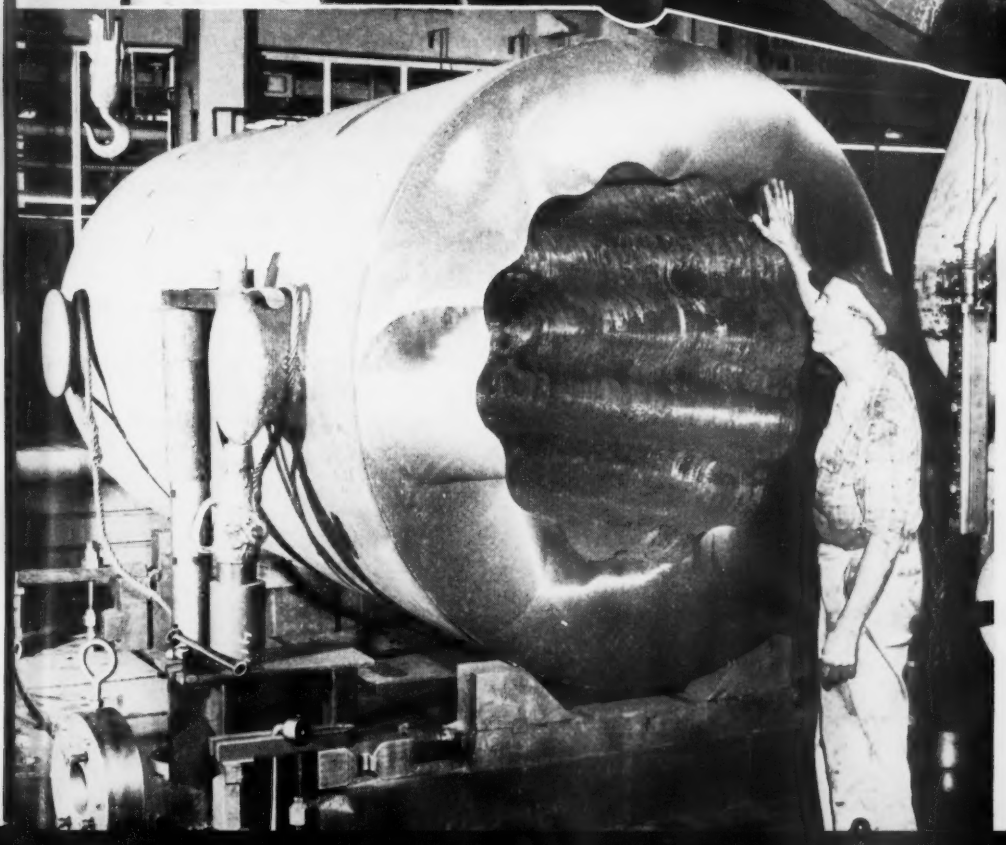


A section of the flask is lowered around the core. Four workmen (one, above, is not visible) see that chains do not damage core

Two ladles pouring simultaneously feed the molten iron to the mold. Flames come from waste burned to ignite the escaping gases

Below—Powder torch burns off risers. It uses finely powdered aluminum and iron filings in a stream of oxygen to produce heat





Final machining was done in Kaiser's machine shop. The completed molds were shipped in railroad cars. Heavy hardwood blocking was used to stop shifting

Fig. 1—Centrifugal casting units for production of smaller tubes. Pouring spout shown at left

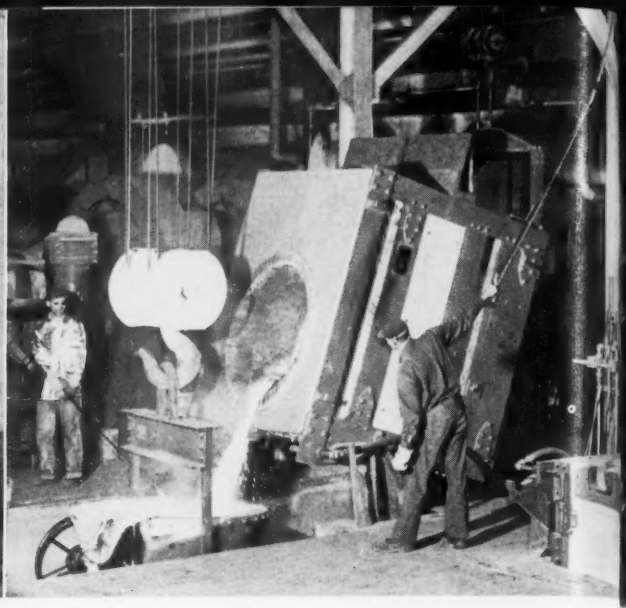


Fig. 2—Partial view of high frequency induction furnaces melting ferrous and nonferrous alloys

Foundry Specializes in CENTRIFUGAL

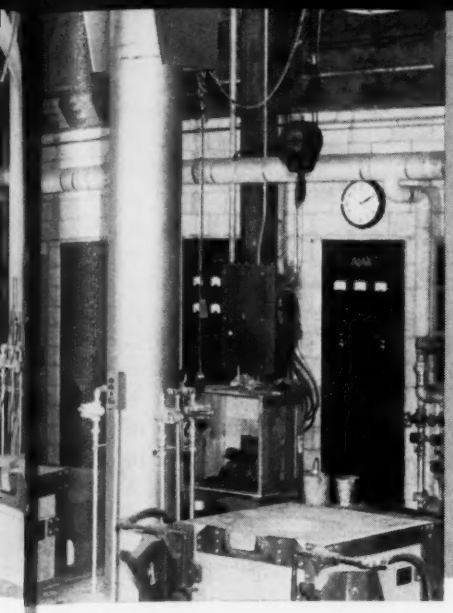
Products include a wide range of hollow cylindrical tubes which vary in size from 3 to 54 in. in diam, up to 27 ft in length and from 25 to as much as 60,000 lb in weight. Both ferrous and nonferrous alloys are cast

SINCE its incorporation in May, 1904, Sandusky Foundry & Machine Co., Sandusky, O., has been a producer of quality nonferrous castings. A little over 45 years ago, dissatisfaction with statically cast, hollow nonferrous rolls for papermaking machines led the company to investigate and eventually to perfect a centrifugal casting process for producing them. Resulting improvement in quality of the rolls, particularly in density, uniformity of structures and freedom from porosity, eventually led the firm to specialize only in centrifugal casting.

Over the years the field of application for the centrifugally cast nonferrous hollow cylinders or tubes has expanded to use in textile machinery, such as ships' stern tube bushings, propeller shaft sleeves, pump rotors and liners, bushings, etc. With that expansion, the sizes and weights also broadened, and at present the firm produces hollow cylinders from 3 to 54 in. in diameter and up to 27¼ ft long. Long lengths are produced mainly in the larger diameters. The tubes range in weight from about 25 lb for one 3 in. in diameter up to 60,000 lb for one 54 in. in diameter and 27¼ ft long.

After years of specialization in the nonferrous centrifugal casting field, covering a wide range of alloys, Sandusky Foundry & Machine decided recently to expand its range of alloys to include ferrous materials. Although the open-flame, rotary oil-fired furnaces of its own design served successfully in melting nonferrous alloys, the temperatures reached were not high enough to handle many of the ferrous alloys. Consideration of the problem led to selection of high-frequency electric induction furnaces since they permitted considerable flexibility and could be used for melting both ferrous and nonferrous alloys.

Fig. 3—Open flame rotating type furnaces on the right will handle up to 14 tons of nonferrous metals. Large casting machines are across aisle



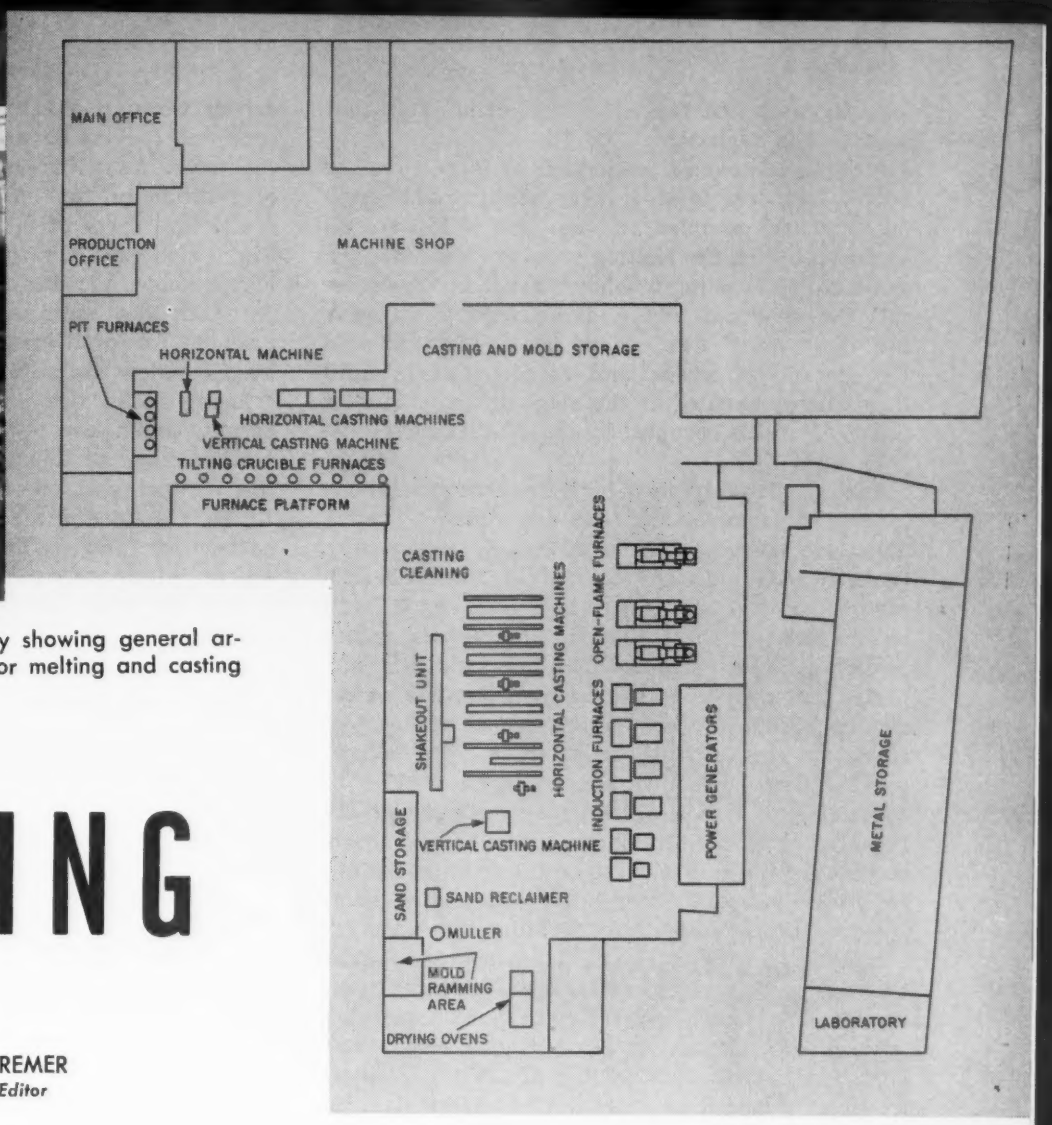


Fig. 4—Plan of the foundry showing general arrangement of equipment for melting and casting

CASTING

By EDWIN BREMER
Metallurgical Editor

Induction units of 500-lb, 1000-lb, 2000-lb, 5000-lb and four of 10,000-lb capacity are located in an area formerly occupied by three oil-fired rotary furnaces. Three oil-fired units, with capacities of 14,000 lb each, have been retained to handle the bulk of nonferrous melting. Flexibility of the present furnace arrangement permits pouring single heats of 84,500 lb in nonferrous alloys or 42,500 lb in ferrous alloys or various combinations up to those with the electric furnaces. Power generating equipment for these furnaces is divided into two banks of 1250-kw capacity each, with switching arrangements so that power can be supplied to any or all of the furnaces.

Essentially, the foundry is divided into two sections, as shown in the accompanying sketch, Fig. 4. The induction furnaces just mentioned are located in the section devoted to large castings, and this area will be described later. The small casting department occupies an area about 60 x 100 ft. It contains five centrifugal casting machines located along one side with ten tilting-type crucible furnaces of 600-lb capacity along the other side and four 175-lb capacity furnaces at one end. The ten furnaces are elevated about 5 ft above floor level on a concrete platform 19 ft wide and 80 ft long. Crucibles are charged from the platform. The four furnaces at the end of the building are melting units of the kind known as pit type.

Metal from the ten furnaces is supplied to four horizontal-axis centrifugal casting units producing tubes up to 12 in. in diameter. The pit-type furnaces supply metal to one small horizontal axis and to one vertical axis casting machine. As shown in Fig. 1, the casting machines are enclosed in sheet metal housings. Molds are supported on pairs of roller bearings near each end. One roller of each pair is driven by V-belts attached to electric motors. Speed of rotation of the molds depends on the diameter of the tube being cast and is adjusted so that a centrifugal force of 60 g or more is exerted.

Metal is introduced into the mold through a pouring spout shown at the left in Fig. 1. As may be seen, it is funnel-shaped and has a short tube at the lower end which projects into the mold. Pouring spouts are mounted on wheels so that they can be moved up to and away from the molds and are made in several sizes for filling molds of different sizes. Faceplates are bolted on the fronts and backs of the molds. They contain holes with diameters based on the desired wall thickness of the casting to be poured. Metal charges carefully weighed into the crucibles constitute actual control of wall thickness. Front faceplate shown in the foreground of Fig. 1 is removed so that the cast-

ing can be pulled from the mold, and after that operation is replaced.

Section devoted to production of large tubes or hollow cylinders is at a right angle to the small foundry and occupies an area 140 x 292 ft. As shown in Fig. 4, the melting units are located along one wall, the casting machines about in the center and the shakeout and cleaning department near the other wall. One end of the foundry is used for storage of molds and rough castings until they can be handled in the machine shop. Part of the other end is occupied by the mold ramming department.

Partial views of the high-frequency induction melting equipment and the open-flame rotating units are shown in Figs. 2 and 3, respectively. Covered ladle pits are located in front of each furnace, as may be observed in Figs. 2 and 5. Ladle pits in front of the induction furnaces are opened by depressing a section of the floor which is supported on a large hydraulic ram. Positive safety locking devices prevent any movement of the floor section in either of its two positions. Pits in front of the open-flame furnaces are opened (Fig. 5) by sliding a section of the floor back under the furnace. Large furnaces are charged, as shown in Fig. 7, by use of elevating-type fork trucks and steel tote boxes. Small ones are charged by hand.

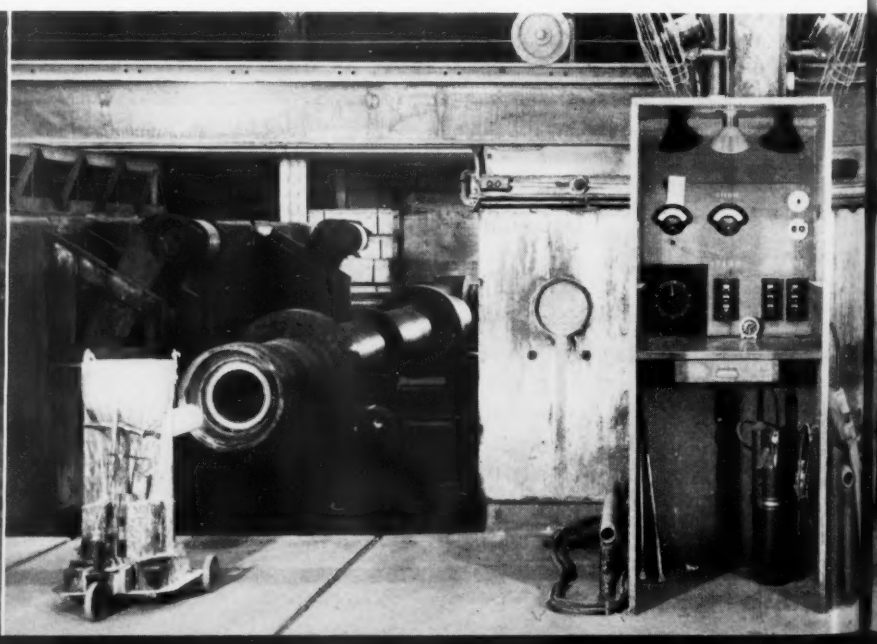
Views of the centrifugal casting machines are presented in Figs. 6 and 8. Machines are located between thick concrete walls. When they are in operation, the top is covered with a movable steel roof, and sliding doors at each end close those entrances. At the left in Fig. 6, a mold is shown in place, the control panel in the center, and the driving motors for another machine are shown at the right. Molds are about 30 ft long and made in two sections bolted together. Two heavy steel tires, one near each end, form the bearing areas on which the mold rotates. These rest on a like number of pairs of rolls. One of each pair of rolls is driven through V-belts attached to electric motors, and friction between rollers and tires rotates the mold. As with the smaller molds, the speed of rotation of the large ones is such to give a centrifugal force of 60 g or more. At the left in Fig. 6 also may be seen a small pouring spout, and Fig. 8 shows pouring into a large spout. The department also contains a vertical-axis centrifugal machine for production of large-diameter, short-length hollow castings or rings.

Large molds are sand lined, a feature which permits production of tubes or hollow cylinders in a wide range of diameters. Molds are rammed in the vertical position, as depicted in Figs. 9 and 10, with the use of a short section of a cylindrical pattern or "plug." These plugs, about 3 ft long, are of bronze or wood depending upon frequency of use. Molds are set up on end as shown in Fig. 10, and the pattern or plug is lowered into it and centered. Procedure for lining the mold with sand depends on the inside diameter of the mold. If it is too small for a man to enter and work, the sand is rammed in place from the top with long wooden rods. Where molds are large enough for one or two men to enter, he or they are lowered to the top of the pattern, and the sand is rammed in place with pneumatically operated rammers, as shown in Fig. 9.

With small-diameter molds, the molding sand is dropped from the top in small increments and rammed to the desired density with the rods. That cycle is continued until sand is rammed to the top of the pattern. Then the latter is pulled up carefully about 2 ft with a hoist. That leaves enough of the pattern imbedded in the sand to maintain its concentricity in relation to the mold. Then more sand is added, rammed, etc., and the cycle continued until the mold is lined fully with sand to the top. Procedure for lining the large molds is quite similar except that, due to the presence of a man or men in the mold, the proper amounts of

Fig. 5—Ladle pits in front of open flame units are covered by a slidable section of the floor which is moved backward underneath the furnace

Fig. 6—Large centrifugal casting machines are located between heavy concrete walls. Movable roof and doors enclose structure when in use



sand are lowered in a bucket. Sand is dumped and distributed, and then the bucket is hauled up out of the way until additional sand is needed.

Sand for the molds is mixed in a muller on the floor adjacent to the mold ramming section and is hoisted to the operating platform. Sand is composed of about 50 per cent reclaimed sand, and 50 per cent new ingredients. Reclaimed sand is obtained by a screening process which scalps the lumps, discards the coarse conglomerate and fines, and retains the intermediate material. Sufficient moisture in the range of 7 per cent is added to make the sand workable.

After the molds have been lined, they are picked up vertically by a crane and moved about 30 ft across the gangway into the oil-fired drying oven shown in Fig. 12. The oven is 9 ft wide, 22 ft long and 30 ft high and is divided into two sections 13 and 9 ft long. As may be seen in Fig. 12, the doors extend the full height of the oven. The 9-ft section on one end of the oven has one door, and the 13-ft section has two. Floor is formed of cast steel grids, with the burners located beneath. Molds are dried for 12 hrs to provide a hard dry surface which will resist cutting and washing action of the stream of molten metal poured on it. Drying of the molds also results in a more permeable sand for carrying away any gases which may be developed at the sand-metal interface.

Dried molds are taken from the ovens and laid on the floor. Steel rope slings are placed around them, and they are lifted in the horizontal position and placed in the centrifugal casting machines. For each mold the production planning department sends to the casting department an order containing instructions as to type and amount of the alloy to be poured, rotational speed for the mold, pouring temperature and time and cooling time. From those data the furnaces are charged with the correct quantity of alloy, a suitable pouring spout selected, etc.

Since the molds are extremely heavy, they have to be brought up to speed in several steps, and while that is being accomplished the pouring spout

Fig. 7—Large furnaces are charged by elevating type fork trucks which raise steel tote boxes containing weighed material to furnace mouth.

Fig. 8—Molten metal from the ladle is directed into the rapidly rotating mold by a refractory lined metal spout. Pouring operation is timed

Fig. 9—When diameter of mold is sufficient the men are lowered into it to ram sand into place

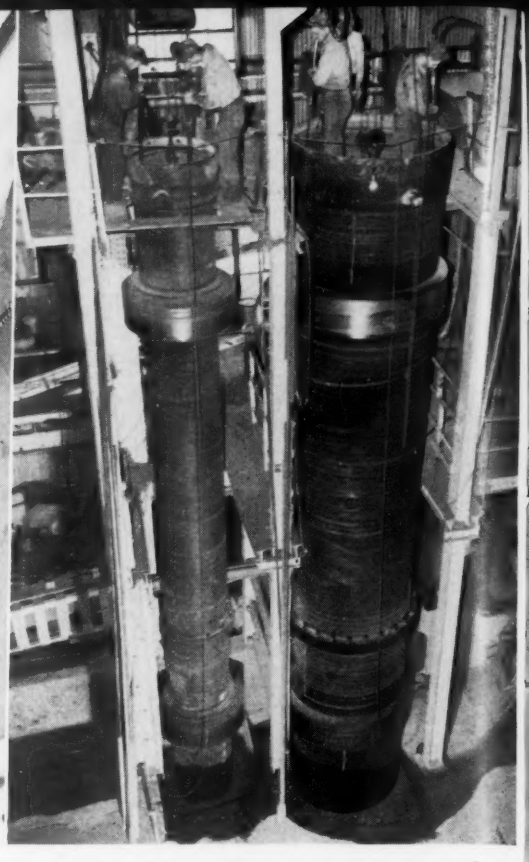


Fig. 10—Large steel molds made in two sections are bolted together. Heavy steel tires at each end form the bearings upon which they rotate

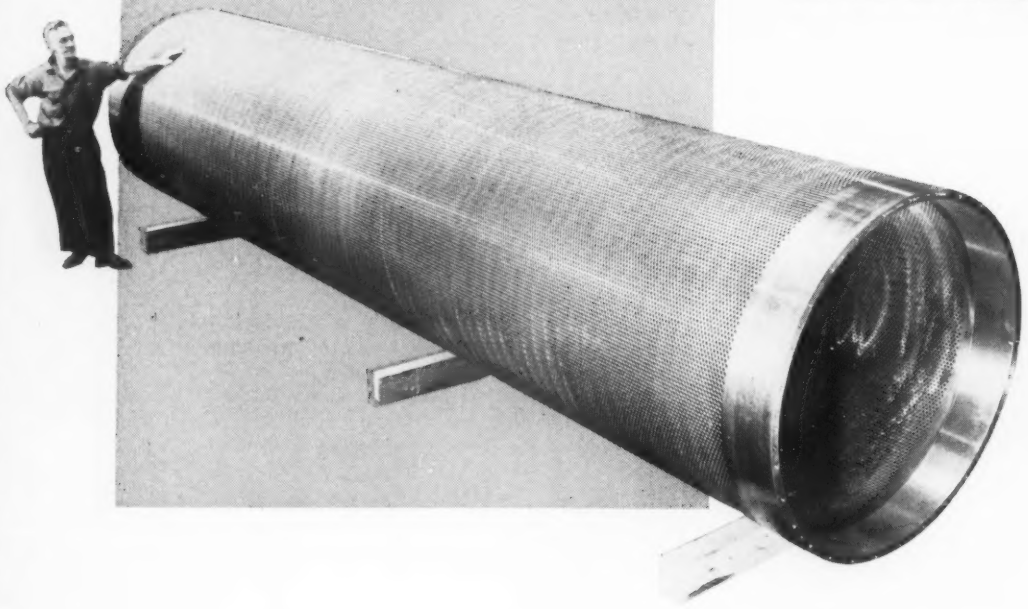


Fig. 11—Large papermaking machine roll is perforated by thousands of accurately drilled holes which conform to a definite pattern. Work is performed on specially designed drilling machines

is rolled up to the mold, the wheels are wedged to prevent movement, and the ladle containing the alloy is brought to the mold. The ladle is skimmed and the temperature taken. Usually the temperature is slightly high to allow for a drop in moving from furnace to mold side and skimming. The metal is allowed to cool for a few minutes until the specified pouring temperature is reached. Then it is poured at a rate to conform to the time designated for the operation.

After the mold has been filled, the pouring spout is removed and the mold allowed to spin. Although the molds are water-cooled on the exterior by heavy water sprays, that cooling is not sufficient to provide the desired cooling rate in the casting or cylinder to insure a uniformly fine-grained structure. Therefore, at a specified time after the mold has been filled, the interior is sprayed with a jet of water to supply additional cooling. Period of waiting between completion of pouring and injecting water varies according to the wall thickness of the casting. Water is injected at short intervals, rather than continuously, to obtain full benefit of the evaporative cooling effect generated by conversion of water to steam.

When the casting has cooled to the desired level, the mold is lifted from the machine with a crane and transported to the cleaning department. There

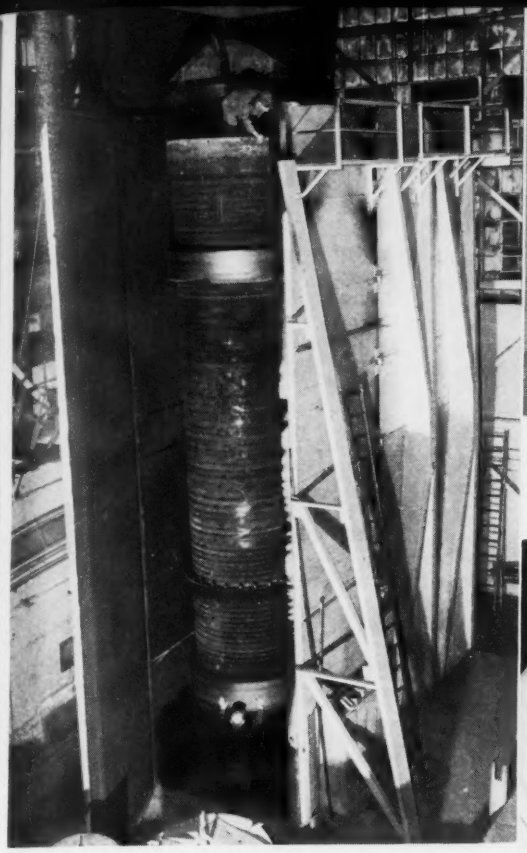


Fig. 12—Oil-fired oven for drying molds is divided into two compartments. Molds are transported vertically with a crane from the ramming department

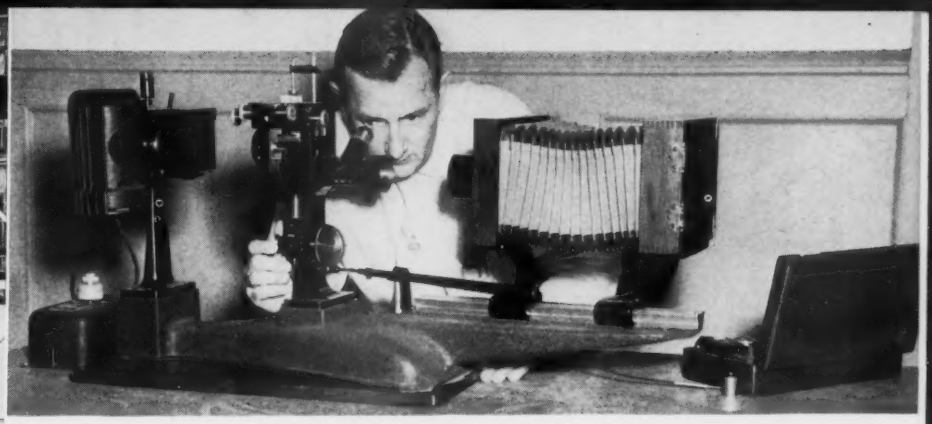


Fig. 13—Metallographic examination of specimens obtained from castings is employed to study structural formations

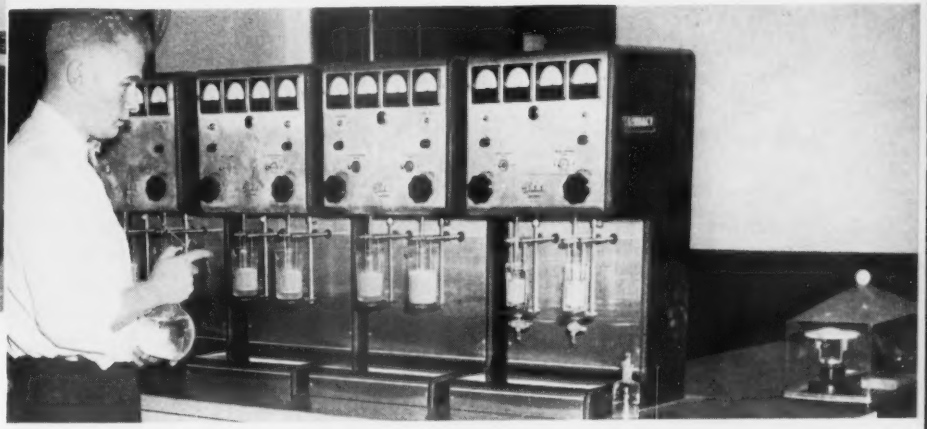


Fig. 14—Electrolytic determination for copper and other elements in nonferrous alloys used in chemical analysis

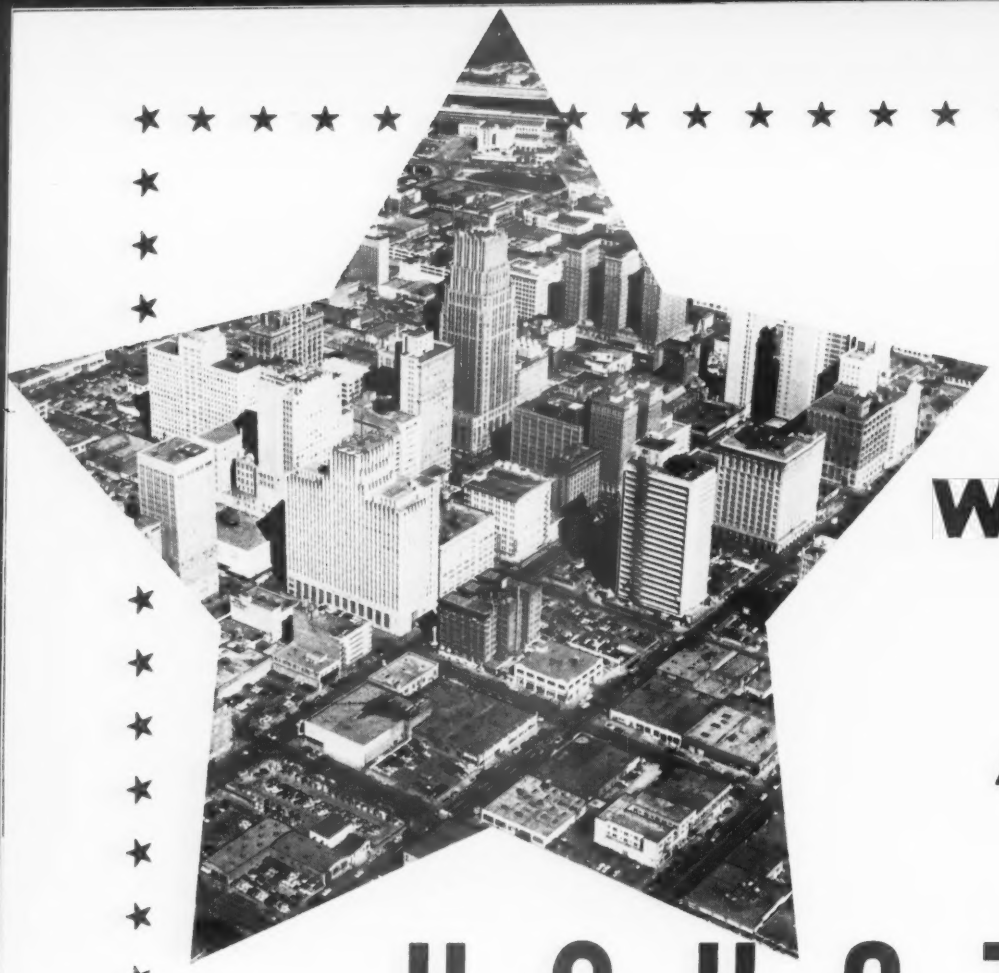
it is laid horizontally on sturdy supports attached to bumper or jolting equipment. In a short period of time the hard sand lining of the mold is disintegrated sufficiently to permit pulling the casting from the mold. Sand from the mold drops into a chute beneath the shakeout machine which deflects it into a bucket in a covered pit next to the machine. When all sand has been removed from the mold, it is picked up and taken back to the ramming department or placed in storage at the other end of the building.

The exterior surface of the casting is examined for any adhering sand, the presence of any small fins resulting from cracks in the sand lining of the mold and for rough areas caused by the cutting action of the metal stream. Usually the castings strip cleanly from the mold, and fins and rough spots appear only occasionally. When any of those occur, however, they are removed by chipping with pneumatic hammers or grinding. Following inspection the casting is placed in storage or sent to the machine shop.

Since centrifugally cast tubes made by Sandusky Foundry & Machine Co. are shipped largely in the finished state, the firm maintains an extensive machine shop for machining the exterior and interior. As might be expected, some massive machine tools are involved in machining the larger castings; they include lathes with beds 30 and 40 ft long which are able to swing the cylinders, some of which are almost 6 ft in diameter.

One specialty of the firm is the production of rolls for papermaking. As shown in Fig. 11, these rolls are perforated with a myriad of small drilled holes in a definite pattern. For that purpose the firm has a number of multiple-spindle drilling machines which automatically index. One such machine, for example, with 228 spindles in a line, simultaneously drills that many holes in the matter of seconds and automatically indexes to drill another row of holes. On some rolls it is estimated that nearly half a million holes form the perforations. Some rolls are drilled, sent outside to be covered with rubber and returned, and holes are drilled in the rubber coating, accurately matching the previously drilled holes in the metal roll.

To obtain a quality product, Sandusky Foundry & Machine Co. maintains a well equipped laboratory for determination of the chemical, physical and metallographic properties of both raw materials and finished products. A sand laboratory handles routine and development work on molding sand. At present, the firm can supply tubes or cylinders in 27 high-alloy steel compositions for corrosion and heat resistant application, 24 plain-carbon and low-alloy steels, 20 nonferrous alloys and a range of plain and alloy gray irons.



TEXANS WELCOME AFS TO HOUSTON

TEXANS are readying a welcome for the nation's foundrymen. For the first time the American Foundrymen's Society turns to the Southwest for the site of its national convention, and May 23-27 will find many of the industry's representatives in Houston for this 59th annual AFS meeting.

Registration headquarters for the convention will be the Rice Hotel. Most of the technical sessions will be held there; others are scheduled for the Texas State Hotel and the Lamar Hotel. Ladies will register at the Shamrock.

Technical Program—An extensive technical program will be presented at Houston. It includes more than 100 papers, in addition to eight shop course sessions and a number of roundtable luncheons. Shop courses, scheduled for Monday and Tuesday evenings, are sponsored by the Brass and Bronze, Malleable, Light Metals, Sand and Gray Iron Divisions. New to the technical program will be a Friday afternoon Symposium on Nondestructive Testing planned in co-operation with the Society for Nondestructive Testing.

Technical sessions of the Brass and Bronze and Malleable Divisions will be held on Monday and Tuesday. Light metal subjects will be discussed the first three days of the week, while gray iron and steel sessions are scheduled for Wednesday, Thursday and Friday. Pattern, refractories and heat transfer topics will be covered at Wednesday and Thursday meetings.

Honoring the late Dr. Harry A. Schwartz, for many years chairman of the Heat Transfer Committee, that group will present as its program a "Dr. H. A. Schwartz Memorial Forum on the Application of Heat Transfer Principles to Foundry Practice."

The Sand Division has a broad five-day program that includes eight technical sessions in addition to the two shop courses and a dinner. The dinner meeting Tuesday evening, expected to be one of the high lights of the program, will have as its discussion subject the carbon

dioxide process for the chemical hardening of cores and molds. Dr. Waldemar Schumacher of Germany, the speaker, also will show a movie describing the process.

Dates for sessions on other specific and general interest subjects include: Education and industrial engineering, both groups Tuesday sessions and Thursday luncheons; plaster mold casting, Monday; plant and plant equipment, Wednesday. Six sessions devoted to safety, hygiene and air pollution control are planned for Tuesday, Wednesday and Thursday.

The list of subjects and speakers at individual sessions starts on page 138 of this issue.

Business Meeting—AFS President Frank J. Dost, president, Sterling Foundry Co., Wellington, O., will preside at the society's business meeting Wednesday morning and give the president's annual address. Prizes to winners in the national AFS apprentice contest will be awarded at this meeting, followed by election of society officers and directors for 1955-56. Nominees for election are:

President, Bruce L. Simpson, president, National Engineering Co., Chicago; vice president, Frank W. Shipley, foundry manager, Caterpillar Tractor Co., Peoria, Ill.; directors for three years, C. W. Gilchrist, foundry superintendent, Cooper-Bessemer Corp., Mt. Vernon, O.; Charles E. Nelson, technical director, Magnesium Division, Dow Chemical Co., Midland, Mich.; O. Jay Myers, technical director, Foundry Products Division, Archer-Daniels-Midland Co., Minneapolis; Richard A. Oster, director, Beloit Vocational and Adult School, Beloit, Wis.; Curtis C. Drake, plant superintendent, Griffin Wheel Co., Denver; Robert W. Trimble, foundry superintendent, Bethlehem Supply Co., Tulsa, Okla.

Immediately following the business meeting,

Fred J. Walls will deliver the Charles Edgar Hoyt Memorial Lecture during the Houston convention

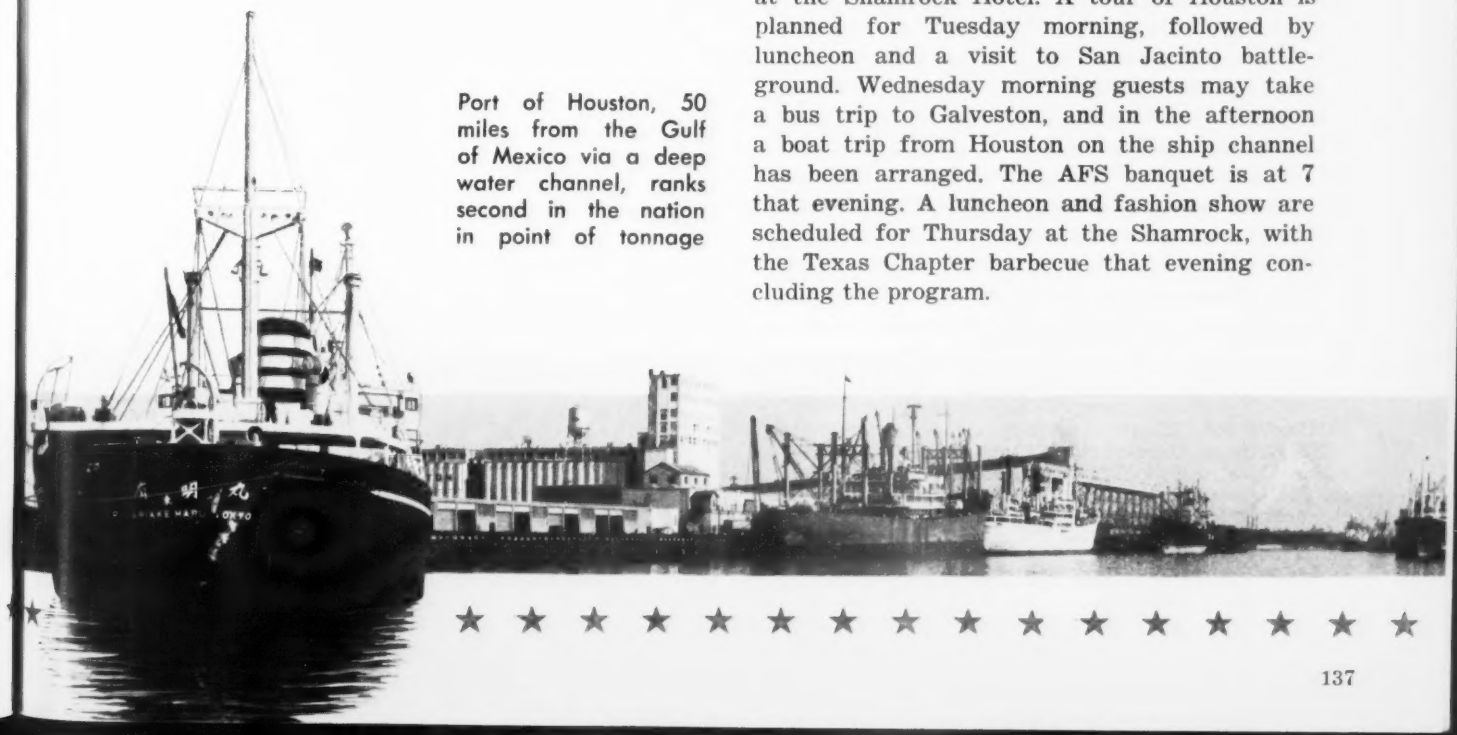
the Charles Edgar Hoyt Memorial Lecture will be presented by Fred J. Walls, International Nickel Co. Inc., Detroit. Subject of Mr. Walls' lecture will be "Education and the Future Foundryman."

The Shamrock Hotel will be the site of the annual banquet Wednesday evening. Featuring the program will be the presentation of AFS gold medal awards and honorary life memberships to six outstanding foundrymen. Biographies of the recipients start on page 146 of this issue.

Plant Visitations—Texas Chapter of the AFS has arranged for convention visitors to inspect plants of various producers and consumers of castings in Houston during the week. These plants and the dates on which they may be visited are listed on page 143.

For the enjoyment of visitors the chapter also is planning a "Texas Chapter Night" for Thursday. The program includes entertainment and a barbecue dinner at the Pin Oaks Stable horse show pavilion.

Ladies' Entertainment—Ladies attending the convention will be offered a variety of entertainment during the week. Monday afternoon the official AFS reception and tea will be held at the Shamrock Hotel. A tour of Houston is planned for Tuesday morning, followed by luncheon and a visit to San Jacinto battleground. Wednesday morning guests may take a bus trip to Galveston, and in the afternoon a boat trip from Houston on the ship channel has been arranged. The AFS banquet is at 7 that evening. A luncheon and fashion show are scheduled for Thursday at the Shamrock, with the Texas Chapter barbecue that evening concluding the program.



Port of Houston, 50 miles from the Gulf of Mexico via a deep water channel, ranks second in the nation in point of tonnage

CONVENTION PROGRAM

MONDAY, MAY 23

9 a.m.—Registration and publications display open—mezzanine, Rice Hotel

10 a.m.—Brass and Bronze Session

Presiding, W. H. Baer, Bureau of Ships, Navy Department, Washington; co-chairman, A. W. Bardine, Ohio Brass Co., Mansfield, O.

Feeding of Castings, Thornton C. Bunch and George E. Dalbey, Mare Island Naval Shipyard Foundry, Vallejo, Calif.

Vapor Holes in Brass and Bronze Castings from Loose Sand Grains, W. B. George and Floyd Keller, R. Lavin & Sons Inc., Chicago

10 a.m.—Plaster Mold Session

Presiding, Hyman Rosenthal, Pitman-Dunn Laboratories, Frankford Arsenal, Philadelphia; co-chairman, George R. Gardner, Aluminum Co. of America, Cleveland

Production of Flexible-Faced Coreboxes for Metal Casting Plaster Cores, Robert F. Dalton, Hills-McCanna Co., Chicago

Surface and Internal Bubble Control in Poured Investment Plasters, Robert G. Megaw, United States Gypsum Co., Chicago

Influence of Vibration on Fluidity and Filling During Investment Casting of an Aluminum Alloy, D. W. Levinson, A. H. Murphy, and W. Rostoker, Armour Research Foundation of Illinois Institute of Technology, Chicago

10 a.m.—Malleable Session

Presiding, W. A. Kennedy, Grinnell Co., Providence, R. I.; co-chairman, W. M. Albrecht, Chain Belt Co., Milwaukee

Effects of Trace Amounts of Tin, Lead and Antimony on the Annealing of Blackheart Malleable Iron, R. C. Shnay, Department of Mines and Technical Surveys, Ottawa, Ont., J. E. Wilson and J. E. Rehder, Canada Iron Foundries, Montreal

Embrittlement, Toughening and Sub-critical Thermal Treatment of Malleable Iron, Gilbert E. Kempka, Johnson Motors, Waukegan, Ill.

12 noon—Brass and Bronze Roundtable Luncheon

Presiding, B. A. Miller, Crown Non-Ferrous Foundry Co., Chester, Pa.; co-chairman, H. L. Smith, Federated Metals Division, American Smelting & Refining Co., Hammond, Ind.

Functions of the Copper Division, BDSA, W. A. Meissner, deputy director, Copper Division, Business and Defense Services Administration, Department of Commerce, Washington

12 noon—Malleable Roundtable Luncheon

Presiding, R. J. Anderson, Belle City Malleable Iron Co., Racine, Wis.

Producing Solid Castings with Minimum Cost for Feeders, B. C. Yearley, National Malleable & Steel Castings Co., Cleveland

2 p.m.—Cost Session

Presiding, C. E. Westover, Westover Engineers, Milwaukee; co-chairman, William Busby, Texas Foundries, Lufkin, Tex.

Modern Management Control, Roger K. Dailey, Lester B. Knight & Associates, Chicago

The Management Task in a Competitive Economy, L. L. Ellis, Booz, Allen & Hamilton, 135 South LaSalle St., Chicago

2 p.m.—Light Metals Session

Presiding, D. L. Colwell, Apex Smelting Co., Cleveland; co-chairman, W. A. Mader, Oberdorfer Foundries Inc., Syracuse, N. Y.

Shell Molding of Magnesium Alloys, Nicholas Sheptak, Dow Chemical Co., Midland, Mich.

Foundry Characteristics and Properties of the Magnesium Sand Casting Alloy HZ32XA, K. E. Nelson, Dow Chemical Co., Midland, Mich.

Mechanical Properties of Cast Titanium-Silicon Alloys, Harry W. Antes and Ralph E. Edelman, Pitman-Dunn Laboratories, Frankford Arsenal, Philadelphia

2 p.m.—Sand Session

Presiding, Robert Lang, Lufkin Foundry & Machine Co., Lufkin, Tex.; co-chairman, F. S. Brewster, South Gate Aluminum & Magnesium Co., South Gate, Calif.

The General Motors Experimental Foundry, L. J. Pedicini, GMC Process Development Section, Detroit

What Are Your Raw Material Costs?, S. C. Massari, Hansell-Elcock Co., Chicago

4 p.m.—Brass and Bronze Shop Course

Presiding, John G. Collier, Garrott Brass & Machine Co., Houston, Tex.; co-chairman, John C. Calhoun, Dee Brass Foundry, Houston, Tex.

Molding Equipment for the Brass Foundry

Melting Equipment for the Brass Foundry

4 p.m.—Malleable Shop Course

Presiding, Eric Welander, John Deere Malleable Works, East Moline, Ill.

Pearlitic Malleable. Panel members: R. J. Anderson, Belle City Malleable Iron Co., Racine, Wis.; C. F. Joseph, Central Foundries Division, GMC, Saginaw, Mich.; Milton Tilley, National Malleable & Steel Castings Co., Cleveland; P. F. Ulmer, Link-Belt Co., Indianapolis

4 p.m.—Light Metals Session

Presiding, W. D. Stewart, Aluminum Co. of America, Pittsburgh; co-chairman, A. Slachta, Wright

Aeronautical Division, Wood-Ridge, N. J.

Application of Insulated Risers to the Production of Aluminum Alloy Sand Castings, W. A. Mader, Oberdorfer Foundries Inc., Syracuse, N. Y.

Measurement of Gas in Molten Aluminum, H. Rosenthal and S. Lipson, Pitman-Dunn Laboratories, Frankford Arsenal, Philadelphia

8 p.m.—Gray Iron Shop Course

Presiding, K. H. Priestley, Vassar Electroloy Products Inc., Vassar, Mich.; co-chairman, L. L. Clark, Armour Research Foundation, Chicago

Practical Inoculation of Cupola Melted Irons: Discussion leader, Harold E. Barnum, Vanadium Corp. of America, Detroit

8 p.m.—Sand Shop Course

Presiding, R. H. Olmsted, Whitehead Bros. Co., New York; co-chairman, F. E. Kurtz, Electric Steel Castings Co., Speedway, Ind.

Fitting Sand Control to Your Foundry—Moderator, Frank S. Brewster, South Gate Aluminum & Magnesium Co., South Gate, Calif. Panel members: T. C. Alford, Wheland Co., Chattanooga, Tenn.; Harry Wilson, Electron Corp., Littleton, Colo.; Fred W. Jacobs, Texas Foundries Inc., Lufkin, Tex.

TUESDAY, MAY 24

9:30 a.m.—Education Session

Presiding, R. Verne Righter, Central Foundry Division, GMC, Danville, Ill.; co-chairman, James R. Hewitt, Texas Foundries Inc., Lufkin, Tex.

Workshop for Local Chapter Education Committee Chairmen. Panel members: A. C. Hensel, Albion Malleable Iron Co., Albion, Mich.; Frank C. Cech, Cleveland Trade School, Cleveland; Ormond Requadt, Dow Chemical Co., Bay City, Mich.; R. A. Oster, Adult and Vocational School, Beloit, Wis.

9:30 a.m.—Sand Session

Presiding, A. B. Keckly, Texas Electric Steel Castings Co., Houston, Tex.; co-chairman, H. E. Henderson, H. C. Macaulay Foundry Co., Berkeley, Calif.

Steel Foundry Sands at Elevated Temperatures, H. W. Meyer, General Steel Castings Co., Granite City, Ill.

The Scabbing Defect—Progress Report of Committee 8-J. R. L. Doelman, Miller & Co., Chicago

A New Foundry Sand Core Binder, Charles J. Gogek, George M. Moffett Research Laboratories, Corn Products Refining Co., Argo, Ill.

9:30 a.m.—Light Metals Session

Presiding, D. O. LaVelle, Federated Metals Division, American Smelting & Refining Co., South Plainfield, N. J.; co-chairman, J. W. Meier, Department of Mines and Technical Surveys, Ottawa, Ont.

The Meaning of the Cast Test Bar in the Evaluation of Aluminum and Magnesium Alloy Castings, A. G. Slachta and H. Mansfield, Wright Aeronautical Division, Curtiss-Wright Corp., Wood-Ridge, N. J.

Mechanical Properties of Aluminum Alloy Castings, Roy E. Paine, Aluminum Co. of America, Vernon, Calif., and W. D. Stewart, Aluminum Co. of America, Pittsburgh

9:30 a.m.—Malleable Session

Presiding, C. F. Joseph, Central Foundries Division, GMC, Saginaw, Mich.; co-chairman, Milton Tilley, National Malleable & Steel Castings Co., Cleveland

Effects of Some Melting Variables on the Properties of Malleable Iron—Progress Report. G. E. Kempka, Johnson Motors, Waukegan, Ill., and R. W. Heine, University of Wisconsin, Madison

Metallurgical Controls for Duplexed Malleable, L. E. Emery, Marion Malleable Iron Works Division, Chicago Railway Equipment Co., Marion, Ind.

9:30 a.m.—Brass and Bronze Session

Presiding, R. A. Colton, Federated Metals Division, American Smelting & Refining Co., Newark, N. J.; co-chairman, R. B. Fischer, Ingersoll-Rand Co., Phillipsburg, N. J.

Improvement of Pressure Tightness and Tensile Properties of Gun Metal Bronze by Vacuum Degassing, W. H. Johnson, H. F. Bishop, and W. S. Pellini, Naval Research Laboratory, Washington

Microporosity in Gunmetal Pressure Castings, Al Hesse, Stemac Inc., Chicago, Marvin Glassenberg, Armour Research Foundation, Chicago, and W. H. Baer, Bureau of Ships, Navy Department, Washington

12 noon—Education Division Roundtable Luncheon

Presiding, W. J. Hebard, Continental Foundry & Machine Co., East Chicago, Ind.; co-chairman, W. H. Ruten, Polytechnic Institute of Brooklyn, N. Y.

Plant Training, Donald F. Lane, National Foreman's Institute, New London, Conn.

12 noon—Light Metals Roundtable Luncheon

Presiding, M. E. Brooks, Dow Chemical Co., Bay City, Mich.; co-chairman, E. V. Blackmun, Aluminum Co. of America, Pittsburgh

Castings in Airframe Design, George W. Papen, Lockheed Aircraft Corp., Burbank, Calif.

2 p.m.—Industrial Engineering Session

Presiding, J. A. Westover, Westover Engineers, Milwaukee; co-chairman, L. W. Lehmann, John Deere Van Brunt Co., Horicon, Wis.

Production Standards and Their Place in the Foundry Industry, Stuart D. Martin, Central Foundry Division, GMC, Saginaw, Mich.
Improving Foundry Paperwork, M. E. Mundel, Marquette University, Milwaukee

2 p.m.—Brass and Bronze Session
Presiding, T. E. Gregory, Michigan Smelting & Refining Division, Bohn Aluminum Co., Detroit; co-chairman, George Bradshaw, Philadelphia Naval Shipyard, Philadelphia
A Note on the Short-Time Elevated Temperature Properties of Three Copper-Base Casting Alloys, J. O. Edwards, Department of Mines and Technical Surveys, Ottawa, Ont.
Investigation of Precision Casting of Experimental Propellers, A. R. Willner, David Taylor Model Basin, Washington

2 p.m.—Air Pollution Control Session
Presiding, F. A. Patty, GMC, Detroit; co-chairman, J. C. Radcliffe, Ford Motor Co., Dearborn, Mich.
Report on Program Activities and Introduction of Working Committee Chairmen, J. R. Allan, Melbourne, Fla.
Report on Air Pollution Manual, F. A. Patty
Comparing Change in Emission Rate with Change in Metal Melting Rate (Hot and Cold Blast Operation), R. C. Ortgies, American Air Filter Co., Louisville
Developments in Air Pollution Problems and Their Effects on the Foundry Industry, George D. Clayton, George D. Clayton & Associates, Detroit
Roundtable discussion: Panel members composed of Air Pollution Control Committee

2 p.m.—Sand Session
Presiding, C. W. Williamson, Trinity Valley Iron & Steel Co., Fort Worth, Tex.; co-chairman, E. C. Zirzow, Werner G. Smith Inc., Cleveland
It Is Not All Sand, C. A. Sanders, American Colloid Co., Chicago, and Nathan Levinsohn, Minneapolis-Moline Co., Minneapolis

2 p.m.—Malleable Session
Presiding, J. H. Lansing, Malleable Founders' Society, Cleveland; co-chairman, W. D. McMillan, International Harvester Co., Chicago
Interrelation of Heat Treatment, Mechanical Properties and Machinability of Pearlitic Malleable Iron, J. E. Kruse, Albion Malleable Iron Co., Albion, Mich.
Effects of Molybdenum on Stability and High Temperature Properties of Pearlitic Malleable Iron, W. G. Scholz and D. V. Doane

4 p.m.—Brass and Bronze Shop Course—Shell Molding Session
Presiding, F. L. Riddell, H. Kramer Co., Chicago; co-chairman, Chester A. Mack, Chautauqua Hardware Co., Jamestown, N. Y.
Dimensional Tolerances and Surface Structure in Various Shell Cast Metals, Richard A. Flinn, Walter B. Pierce, and Floyd R. Smith, University of Michigan, Ann Arbor, and Paul F. Youngdahl, Mechanical Handling Systems Inc., Detroit

4 p.m.—Malleable Shop Course—Hot Tearing Session
Presiding, R. W. Heine, University of Wisconsin
Has Research on Hot Tears Prevented Their Occurrence? B. C. Yearley, National Malleable & Steel Castings Co., Cleveland
Effects of the Melting Process on the Cracking Tendencies of Malleable Iron, F. W. Jacobs, Texas Foundries, Lufkin, Tex.

4 p.m.—Light Metals Session
Presiding, F. E. Dye, Burndy Engineering Co., Lynwood, Calif.; co-chairman, C. R. Gregg, Gregg Iron Foundry, El Monte, Calif.
Production of Aluminum Alloy Specification Castings, Roy E. Paine and Dr. P. V. Faragher, Aluminum Co. of America, Vernon, Calif. and Pittsburgh
A Case Study of a Premium Strength Casting, A. J. Carah, Douglas Aircraft Co., Santa Monica, Calif.

6 p.m.—Sand Division Dinner
Presiding, E. C. Zirzow, Werner G. Smith Co., Cleveland; co-chairman, Roy Carver, Carver Pump Co., Muscatine, Iowa
Carbon Dioxide Process for Hardening Cores and Molds, Dr. Waldemar Schumacher, Concordiahutte A. G., Bendorf am Rhein, Germany

8 p.m.—Gray Iron Shop Course
Presiding, K. H. Priestley, Vassar Electroloy Products Inc., Vassar, Mich.; co-chairman, E. J. Burke, Hanna Furnace Corp., Buffalo
Efficient Cupola Operation: Discussion leader, E. J. Henley, Tyler Pipe & Foundry Co., Tyler, Tex.

8:30 p.m.—Sand Shop Course
Presiding, R. H. Jacoby, Key Co., East St. Louis, Ill.; co-chairman, Karl L. Landgrebe, Wheland Co., Chattanooga, Tenn.
Sand Preparation Without Guesswork: Moderator, F. S. Brewster, South Gate Aluminum & Magnesium Co., South Gate, Calif. Panel members: William E. Patterson, Elkhart Foundry & Machine Co., Elkhart, Ind.; Jean Danenfelser, International Harvester Co., Indianapolis, Ind.

WEDNESDAY, MAY 25

9:30 a.m.—AFS Annual Business Meeting
Presiding, AFS National President Frank J. Dost, Sterling Foundry Co., Wellington, O.
President's annual address
Apprentice contest awards
Election of officers and directors
Charles Edgar Hoyt Annual Lecture: *Education and the Future Foundryman,* Fred J. Walls, International Nickel Co., Detroit

12 noon—Industrial Engineering Roundtable Luncheon
Presiding, Milton T. Sell, Sterling Foundry Co., Wellington, O.; co-chairman, Wallace E. Boswell, Glamorgan Pipe & Foundry Co., Lynchburg, Va.
Your Hidden Fixed Costs and Their Effect on Profit and Loss, M. E. Annich, American Brake Shoe Co., Mahwah, N. J.

12 noon—Gray Iron Roundtable Luncheon
Presiding, James S. Vanick, International Nickel Co., New York

12 noon—Pattern Roundtable Luncheon
Presiding, J. W. Costello, American Hoist & Derrick Co., St. Paul; co-chairman, A. F. Pfeiffer, Allis-Chalmers Mfg. Co., Milwaukee
Sealing Metal Coreboxes Against Blow-By, Richard

The AFS annual banquet will be at the Shamrock Hotel Wednesday evening

L. Olson, Dike-O-Seal Inc., Chicago
Wood Pattern Construction Standards and Specifications, John F. Roth, Cleveland Standard Pattern Works Inc., Cleveland

2 p.m.—Sand Session
Presiding, M. W. Williams, Houston Foundry & Machine Co., Houston, Tex.; co-chairman, J. B. Caine, Cincinnati
Current Status of Test Patterns for the Evaluation of Sand Mixtures, Charles Locke, West Michigan Steel Foundry Co., Muskegon, Mich.

2 p.m.—Light Metals Session
Presiding, C. E. Nelson, Dow Chemical Co., Midland, Mich.; co-chairman, R. F. Thomson, GMC Research Laboratories, Detroit
Report of Light Metals Division Research Committee on AFS-Sponsored Vertical Gating Project
Study of Fluid Flow of Light Alloys Through Vertical Gating Systems, J. G. Kura, Battelle Memorial Institute, Columbus, O.

2 p.m.—Dust Control and Ventilation Session
Presiding, H. T. Walworth, Lumbermen's Mutual Casualty Co., Chicago; co-chairman, F. A. Patty, GMC, Detroit
Noise and Its Control in the Foundry, H. T. Walworth
Noise and Its Control, F. A. Patty
Radiant Heat and Its Control, W. G. Hazard, Owens-Illinois Glass Co., Toledo, O.
A New Theory for Grinding Wheel Failures, W. H. Cox and D. C. Williams, Ohio State University, Columbus, O.

2 p.m.—Heat Transfer Session
Presiding, Clarence E. Sims, Battelle Memorial Institute, Columbus, O.; co-chairman, Arthur P. Guidi, Texas Electric Steel Casting Co., Houston
Dr. Harry A. Schwartz Memorial Forum on the Application of Heat Transfer Principles to Foundry Practice. (Part I)
Statement of Dedication, Dr. W. K. Bock, National Malleable & Steel Castings Co., Cleveland
Solidification of Finite Cylinders, Victor Paschkis, Columbia University Research Laboratories, New York
Feeding Range in Shell Molds, R. E. Morey, H. F. Bishop, and W. S. Pellini, Naval Research Laboratory, Washington
Risering of Nodular Iron—Part II—Effect of Silicon Content on Feeding Distance, R. C. Shnay and S. L. Gertsman, Department of Mines and Technical Surveys, Ottawa, Ont.
Heat Transfer Problems in Permanent Molds for Aluminum Castings, W. A. Mader, Oberdorfer Foundries Inc., Syracuse, N. Y.

2 p.m.—Refractories Session
Presiding, Richard H. Stone, Vesuvius Crucible Co., Pittsburgh; co-chairman, Sam F. Carter, American Cast Iron Pipe Co., Birmingham
Improving Refractory Cost in Malleable Melting, L. E. Emery, Marion Malleable Iron Works Division, Chicago Railway Equipment Co., Marion, Ind.
A Malleable Furnace Refractory Cost Reduction Program, Fred J. Pfarr and Albert S. Johnson, Lake City Malleable Co., Cleveland

4 p.m.—Plant and Plant Equipment Session
Presiding, James Thomson, Continental Foundry & Machine Co., East Chicago, Ind.; co-chairman, H. W. Johnson, Wells Mfg. Co., Skokie, Ill.
Shell Molding Process and Equipment, Carl O. Schopp, Link-Belt Co., Indianapolis, and James Sutherland, Link-Belt Co., Chicago
Mechanization for Small Foundries, H. C. Weimer, Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago

4 p.m.—Gray Iron Session
Presiding, C. K. Donoho, American Cast Iron Pipe Co., Birmingham; co-chairman, R. A. Clark, Electro Metallurgical Co., Detroit
Oxygen Content of Gray Cast Iron Increases With Time, R. C. Williams and Harold W. Lownie Jr., Battelle Memorial Institute, Columbus, O.
Dissolved Gases in Liquid Cast Iron, William Y. Buchanan, John Lang & Sons Ltd., Johnstone, Renfrewshire, Scotland
Risering of Gray Iron Castings—Gray Iron Research Progress Report No. 6—E. J. Sullivan Jr., C. M. Adams, H. F. Taylor, Massachusetts Institute of Technology, Cambridge

4 p.m.—Steel Session
Presiding, S. L. Gertsman, Department of Mines and Technical Surveys, Ottawa, Ont.; co-chairman, John R. Patton, General Steel Casting Co., Granite City, Ill.
Hot Tearing in Steel Castings, Charles F. Christopher, Continental Foundry & Machine Co., East Chicago, Ind.
Influence of Molding Materials on the Incidence of Hot Tearing, J. M. Middleton, British Steel Castings Research Association, Sheffield, England
Ruptures in Steel Castings, J. B. Caine, Cincinnati

7 p.m.—Annual banquet—Shamrock Hotel
Presiding, Frank J. Dost, president, AFS
Presentation of AFS gold medal awards and honorary life memberships

THURSDAY, MAY 26

9:30 a.m.—Sand Session
Presiding, Jake Dee, Dee Brass Foundry, Houston, Tex.; co-chairman, F. P. Goettman, Standard Sand Co., Grand Haven, Mich.
Fundamental Principles of the Agglomerating Process, Carl Ludwig, Bonnot Co., Canton, O.
Microscopy and Molding Sands, V. D. Frechette, New York State College of Ceramics, Alfred, N. Y.

9:30 a.m.—Gray Iron Session
Presiding, J. S. Vanick, International Nickel Co., New York; co-chairman, F. T. McGuire, Deere & Co., Moline, Ill.
Calcium Carbide Desulphurization by the Injection Process, John A. DeHuff, Air Reduction Research

Registration and most sessions are at the Rice Hotel

Laboratory, Murray Hill, N. J., and R. Schneidewind, University of Michigan, Ann Arbor

Increasing the Carbon Content of Cast Irons by Ladle Injection, G. E. Spangler, Air Reduction Research Laboratory, Murray Hill, N. J., and R. Schneidewind

A New High Strength Cast Iron Produced by the Injection Process, R. Schneidewind and James W. Estes, Air Reduction Research Laboratory

9:30 a.m.—Pattern Session

Presiding, Harry Arneson, Spring City Pattern Works, Waukesha, Wis.; co-chairman, G. E. Garvey, City Pattern & Foundry Co., South Bend, Ind.

Gypsum Cement Molds for Plastic Patterns and Dies, M. K. Young, United States Gypsum Co., Chicago

Research in the Patternmaking Industry, David T. Kindt, Kindt-Collins Co., Cleveland

9:30 a.m.—Steel Session

Presiding, Dale Hall, Oklahoma Steel Casting Co., Tulsa, Okla.; co-chairman, James H. Lowe, Mid-Continent Steel Casting Corp., Shreveport, La.

What Design Engineers Are Looking for in Castings, Trevor Davidson, Bucyrus-Erie Co., South Milwaukee, Wis.

Steel Castings—Their Engineering Advantages in Weldments, E. J. Wellauer, Falk Corp., Milwaukee

Hot Tears, Lyle L. Clark, Armour Research Foundation, Chicago

Use of Steel Castings by the Southern Pacific Co., B. F. Kline, Southern Pacific Co., Sacramento, Calif.

12 noon—Steel Roundtable Luncheon

Presiding, V. E. Zang, Unitcast Corp., Toledo, O.

Now There's a Good Question—Have You an Answer?

2 p.m.—Heat Transfer Session

Presiding, B. C. Yearley, National Malleable & Steel Castings Co., Cleveland; co-chairman, James H. Lowe, Mid-Continent Steel Casting Corp., Shreveport, La.

Dr. Harry A. Schwartz Memorial Forum on the Application of Heat Transfer Principles to Foundry Practice. (Part II)

Application of Heat Transfer to Hot Tearing, J. B. Caine, Cincinnati

Application of Indirect Chills, Charles Locke, West Michigan Steel Foundry Co., Muskegon, Mich.

Application of Insufficient Chills, E. C. Troy, Riverton, N. J.

Risering of Commercial Steel Castings, Charles W. Briggs, Steel Founders' Society of America, Cleveland

2 p.m.—Safety, Hygiene and Air Pollution Control Program Session

Presiding, John G. Liskow, American Air Filter Co., Louisville; co-chairman, A. G. Granath, National Engineering Co., Chicago

Engineering Manual for Control of In-Plant Environment in Foundries, John G. Liskow

Effects of Inlet and Outlet Connections Upon Fan Performance, W. E. Tracy, Sturtevant Division, Westinghouse Electric Corp., Chicago

Duct Work Efficiencies, Kenneth Robinson, GMC, Detroit

2 p.m.—Refractories Session

Presiding, W. R. Jaeschke, Whiting Corp., Harvey, Ill.; co-chairman, F. W. Jacobs, Texas Foundries Inc., Lufkin, Tex.

Forehearth Refractories for Soda Ash Desulphurizing, Sam F. Carter and Ralph Carlson, American Cast Iron Pipe Co., Birmingham

High Duty, Super-Duty and High-Alumina Refractories in the Foundry, L. L. Gill, Harbison-Walker Refractories Co., Pittsburgh

2 p.m.—Gray Iron Session

Presiding, James T. MacKenzie, American Cast Iron Pipe Co., Birmingham; co-chairman, J. H. Kimes, Lufkin Foundry & Machine Co., Lufkin, Tex.

Fluidization-Injection Process for Desulphurizing and Upgrading Cast Iron—Gray Iron Research Progress Report—G. P. Dahm, H. C. Barnes, C. E. Bieniosek, Linde Air Products Co. Division, Union Carbide & Carbon Corp., Newark, N. J.

Machinability Studies—Relation Between Cutting Temperature and Tool Life for Gray Cast Irons, E. A. Loria, Crucible Steel Co. of America, Pittsburgh, and D. R. Walker, Massachusetts Institute of Technology, Cambridge

Developments in the Light Castings Industry Including the New Die Pressing Process—Exchange paper from Institute of British Foundrymen, Manchester, England—R.S.M. Jeffrey

2 p.m.—Sand Session

Presiding, C. R. McGrail, Alamo Iron Works, San Antonio, Tex.; co-chairman, W. R. Moggridge, Ford Motor Co. of Canada Ltd., Windsor, Ont.

Use of Engineering Methods in Practical Sand Problems: Strength-Density Relationships, V. E. Zang and G. J. Grott, Unitcast Corp., Toledo, O.

3 p.m.—Steel Session

Presiding, Roy C. Hobson, National Malleable & Steel Casting Co., Cicero, Ill.; co-chairman, Hubert Chappie, National Supply Co., Torrance, Calif.

Manufacture of High Quality Pressure Tight Steel Castings, J. F. Wallace, Case Institute of Technology, Cleveland

Factors That Contribute to the Production of Clean Castings, C. B. Williams, Massillon Steel Casting Co., Massillon, O.

Development of a Bottom Pour Ladle Practice for Quality Steel Castings, A. W. Fastabend, American Steel Foundries, East Chicago, Ind.

Ladle Practice, Arthur P. Guidi, Texas Electric Steel Casting Co., Houston, Tex.

4 p.m.—Pattern Session

Presiding, Vaughan C. Reid, City Pattern Foundry & Machine Co., Detroit; co-chairman, John F. Roth, Cleveland Standard Pattern Works Inc., Cleveland

High Pressure Molding, T. E. Barlow, International Minerals & Chemical Corp., Chicago

Precision Patterns from Zircon Molds, J. E. Stock and A. V. Schoville, John Deere Waterloo Tractor Works, Waterloo, Iowa

4 p.m.—Gray Iron Session

Presiding, Alfred Boyles, U. S. Pipe & Foundry Co., Burlington, N. J.; co-chairman, C. R. McGrail, Alamo Iron Works, San Antonio, Tex.

Nickel Austenitic Ductile Irons, F. G. Sefing, International Nickel Co., New York

Theory of Nodular Graphite Formation in Ductile Cast Iron, Paul H. Anderson, South Dakota School of Mines and Technology, Rapid City

Hardenability of Ductile Cast Iron, C. C. Reynolds, W. T. Whittington and H. F. Taylor, Massachusetts Institute of Technology, Cambridge

4 p.m.—Sand Session

Presiding, DeWitt McKinley, McKinley Iron Works, Fort Worth, Tex.; co-chairman, Victor M. Rowell, Archer-Daniels-Midland Co., Cleveland

Load-Carrying Power of Molding Sands, Harry W. Dietert and Alexander Graham, Harry W. Dietert Co., Detroit, and F. S. Brewster, South Gate Aluminum & Magnesium Co., South Gate, Calif.

7 p.m.—Texas Chapter Night

FRIDAY, MAY 27

9:30 a.m.—Gray Iron Session

Presiding, W. C. Jeffery, University of Alabama, University; co-chairman, E. E. Pollard, Tyler Pipe & Foundry Co., Tyler, Tex.

Risering of Nodular Iron—Part II—Effect of Silicon Content on Feeding Distance, R. C. Shnay and S. L. Gertsman, Department of Mines and Technical Surveys, Ottawa, Ont.

Risering of Ductile Cast Iron—Riser Dimensions, Feeding Distance, and Other Data, R. A. Flinn, University of Michigan, Ann Arbor; D. J. Reese, International Nickel Co., New York, and W. A. Spindler, University of Michigan

9:30 a.m.—Sand Session

Presiding, Robert R. Cline, Nibco Mfg. Co., Nacogdoches, Tex.; co-chairman, B. H. Booth, Carpen-

ter Bros. Inc., Milwaukee

Coreroom Practice Pitfalls, Robert H. Greenlee, Auto Specialties Mfg. Co., St. Joseph, Mich.

Critical Analysis of Cylindrical Standard Test Specimens for Foundry Sands, Walter Goetz, George Fischer Ltd., Schaffhausen, Switzerland

Reactions During Core Baking, G. J. Grott, Unitcast Corp., Toledo, O., and H. F. Taylor, Massachusetts Institute of Technology, Cambridge

Clay, Fines, and Water Relationships for Green Strength in Molding Sands, A. H. Zrimsek and R. W. Heine, University of Wisconsin, Madison

9:30 a.m.—Steel Session

Presiding, Thomas H. Shartle, Texas Electric Steel Casting Co., Houston, Tex.; co-chairman, Allan Bixby, National Malleable & Steel Castings Co., Melrose Park, Ill.

Simplified Method for Determining Riser Dimensions, H. F. Bishop, E. T. Myskowski and W. S. Pellini, Naval Research Laboratory, Washington

Application of Chills for the Solidification of Rib and Boss Hot Spots on Plates, H. F. Bishop, E. T. Myskowski

A New Technique Utilizing Pressure Pouring and Permanent Graphite Molds for Production of Steel Car Wheels, Hale H. Hursen, Griffin Wheel Co., Chicago

12 noon—Joint luncheon—Society for Nondestructive Testing and American Foundrymen's Society

Presiding, A. W. Gilbert, Carbide & Carbon Chemical Co., Texas City, Tex.

Nondestructive Testing—A Valuable Tool for the Foundryman, Hans Heine, technical director, AFS.

2 p.m.—Symposium on Nondestructive Testing

Presiding, A. W. Gilbert; co-chairman, Hans J. Heine

Improved Casting Quality Through Nondestructive Testing, Francis H. Hohn, Scullin Steel Co., St. Louis

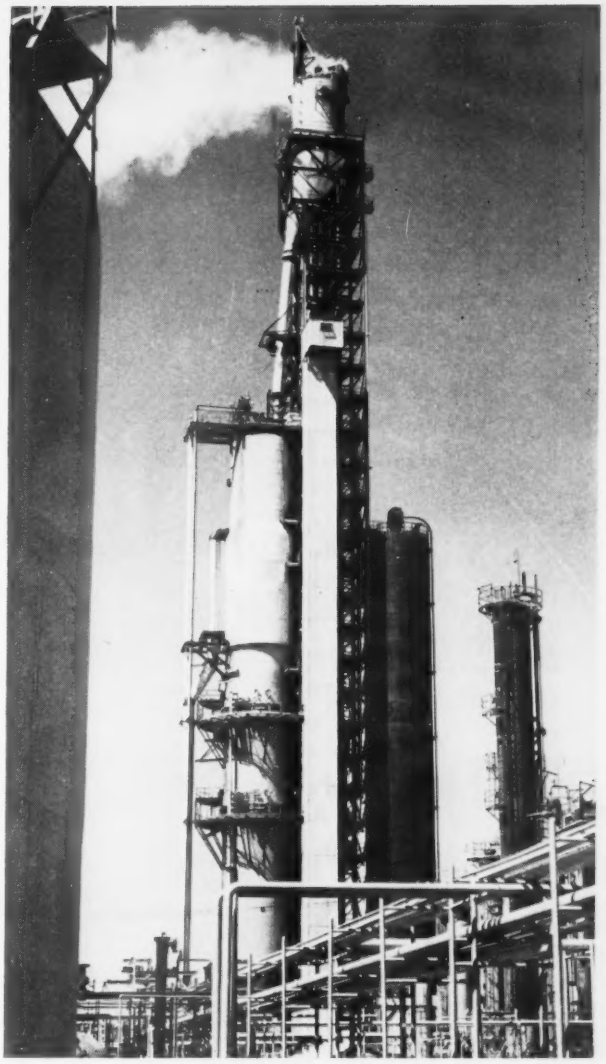
Use of Cobalt 60 for Castings, Jewelle N. Ketchbaw, Industrial Welding and Testing Laboratory, Houston, Tex.

Magnetic Particle Inspection, W. D. Kiehle, Eastman Kodak Co., Rochester, N. Y.

X-ray and Gamma Radiography, J. K. Bell, Sam Tour & Co., New York

Experimental Stress Analysis, Joe W. Beckham, Texas Foundries Inc., Lufkin, Tex.

Industrial Radiography, T. Howard Rogers, Naval Research Establishment of Canada, Halifax, Nova Scotia



Texas photos courtesy of Houston Chamber of Commerce

Texas' oil industry, symbolized by this huge cat cracker, provides a wide market for cast parts

These Houston Plants Will Be Open for Visitors' Inspection

DATE	TIME	COMPANY	PHONE	COMPANY CONTACT	REMARKS
Monday	a.m.	No plant visits scheduled			
May 23	1 to 4 p.m.	Quality Electric Steel Casting Co. 7704 Wallisville Rd.	OR 6625	T. B. DeYoung	Steel castings, semi-mechanized shop.
		Houston Pattern Works 5201 Canal St.	WA 5859	P. B. Croom	Wood and metal pattern equipment.
Tuesday May 24	9 a.m. to noon	Hughes Tool Co. 5425 Polk St.	WO 3101	Jimmy Delmar W. H. Lyne	Manufacturer of oil well drilling tools with mechanized steel foundry. Producing specialty castings for own use. Pattern shop and production machine shops.
	2 to 4:30 p.m.	Cleco Air Tool Div., Reed Roller Bit Co. 5125 Clinton Dr.	OR 1761	Ray V. Gillispie	Manufacturer of pneumatic air tools. Mechanized machine operations.
		Wolf Pattern Works 4820 Clinton Dr.	OS 3-4286	Joe Wolf	Wood and metal pattern equipment.
Wednesday		No plant visits scheduled			
Thursday May 26	9:30 to 11:30 a.m.	Oil Tool Div., Reed Roller Bit Co. 6501 Navigation Blvd.	WO 3121	Paul B. Cravey	Manufacturer of oil well drilling tools. Mechanized machining operations.
		Federal Steel Products Corp. 415 N. St. Charles	CA 6315	A. B. Patison	Steel castings, semi-mechanized shop
	1 to 4 p.m.	Dee Brass Foundry 2408 Everett St.	CA 6271	Nathan Guarino Jake Maenza	Brass, bronze and aluminum castings. Mechanized shop.
		Texas Electric Steel Casting Co. Bringhurst & Gillespie	BL 6503	W. M. Ferguson	Steel and alloy steel jobbing castings. Semi-mechanized shop.
Friday May 27	9 a.m. to noon	Cameron Iron Works Silber Road	VI 4411	A. D. Blackledge	Manufacturer of oil well blow-out preventers, high-pressure valves and well control equipment.
	p.m.	No plant visits scheduled			

F. M. WITTLINGER

EDWARD W. WEY

J. O. KLEIN

J. D. MAGEE

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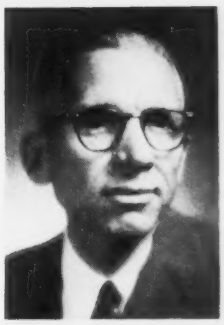
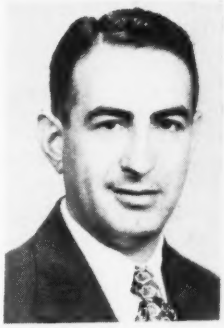


P. B. CROOM



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AFS Names Six MEDALISTS

JOHN B. CAINE

John H. Whiting Gold Medal

John B. Caine, foundry consultant, Cincinnati, has been designated recipient of the John H. Whiting Gold Medal "for outstanding contributions to the society and the industry, particularly in the field of foundry sand research and applications. Mr. Caine received technical education at both the University of Cincinnati and Case Institute of Technology. His career with the industry began in 1923. Prior to becoming a consultant in 1950 he had served individual foundries as metallurgist and as director of research and development. His work also has been recognized by the Steel Founders' Society of America.

J. E. REHDER

Peter L. Simpson Gold Medal

J. E. Rehder will be honored with the Peter L. Simpson Gold Medal "for outstanding contributions to the society and to the foundry knowledge of cast metals." Since 1952 Mr. Rehder has been director of technology and research for Canada Iron Foundries Ltd., Montreal. He previously was foundry metallurgist in charge of the experimental foundry for the Department of Mines and Technical Surveys of the Canadian government. In that capacity he directed research and development work in the gray iron and malleable iron fields. Mr. Rehder is a graduate of McGill University, Montreal.

ROBERT F. THOMSON

John A. Penton Gold Medal

Robert F. Thomson, head of the metallurgy department, Research Laboratories Division, General Motors Corp., Detroit, will receive the John A. Penton Gold Medal "for outstanding contributions to the society and the industry in foundry research, particularly in the field of light metals." Dr. Thomson took both undergraduate and graduate work in engineering at the University of Michigan and became associated with the industry in 1941 as a foundry metallurgist with Chrysler Corp. With International Nickel Co. from 1945-50, since then he has been at GMC Research Laboratories.

and LIFE MEMBERS

ALBERT F. PFEIFFER

Honorary Life Member

Albert F. Pfeiffer, superintendent of pattern shops, Allis-Chalmers Mfg. Co., Milwaukee, will receive an honorary life membership in recognition of his "contributions to the society, its chapters and the industry over many years, for better understanding of patterns and their importance in foundry work, and for his constant encouragement of young men to enter the industry." Mr. Pfeiffer learned patternmaking as an apprentice, and was indentured in 1902 to a company which was purchased by Allis-Chalmers. Last December he observed 52 years' service with that organization. Mr. Pfeiffer has served as national chairman of the AFS Pattern Division and is a past president of the Wisconsin Chapter.

FRANK C. RIECKS

Honorary Life Member

Frank C. Riecks, technical assistant to manager of foundries for Ford Motor Co., Dearborn, Mich., will receive an honorary AFS life membership "for outstanding contributions to the society in the design and construction of the new AFS headquarters building." Mr. Riecks is a graduate of the University of Michigan, and has been associated with the Ford company since 1917. His engineering skill has been utilized for many years on a wide range of construction projects for Ford, not only in this country but in the Orient and Europe. Among the latest was the Cleveland Ford foundry, for which he was project manager. Mr. Riecks has served as a national director of the AFS.

FRANK J. DOST

Honorary Life Member

Frank J. Dost is to be awarded an honorary life membership in the AFS as retiring president of the society. Mr. Dost is president of Sterling Foundry Co., Wellington, O. He has served the society as vice president, national director, and chairman of the Northeastern Ohio Chapter, as well as a member of several committees of the Gray Iron Division. Mr. Dost received his engineering education at the University of Cincinnati. He became a student apprentice with Cincinnati Milling Machine Co. in 1926, and in 1929 joined Williams & Co. Inc. as foundry engineer, engaging in alloy gray iron development. He has been associated with Sterling Foundry since 1933, becoming president in 1952.

Questions and Answers

Cores for cast iron pipes made on arbors wrapped with hay rope and covered with loam . . . Leakage in bronze castings probably due to improper gating . . . Suggests a method for pouring aluminum bronze . . . Conductivity is low

Producing Loam Cores for Pipe

QUESTION Do you have any information on the making of loam cores which are used in the manufacture of pipe and generally consist of a steel barrel on which is first applied the winding of straw rope and is then coated with loam?

ANSWER Either steel or cast iron barrels may be used in making loam cores. The core barrels are perforated freely with vent holes, either cored, punched or drilled, depending on whether the barrel is a cast or rolled product. Hay, corrugated paper, straw and wood wool have all been used to make the rope which is wound around the barrel. The end of the rope is anchored in one of the vent holes near one end of the barrel. A coremaker then guides the rope in a tight-fitting spiral from end to end of the barrel as it is turned. The barrel may be turned by a hand crank or by a belt-driven device.

The rope should be built up to ¾-in. of the radius of the finished core. Should more than one layer of rope be required, each layer of rope should be rubbed with loam. Method of applying the loam depends upon the production required. In jobbing foundries the loam is shoveled onto the rope covered barrel and pressed into place by hand. A strike is set at the proper distance to finish the core to proper size as it revolves.

In the production method of making loam cores the barrel is first dipped in water and then placed on end bearings. A motor-driven clutch is attached to one end and the barrel is set in motion. The speed varies according to the diameter of the barrel. For a 6-in. core the speed is approximately 100 rpm. Sand is released through a narrow slot from a long hopper elevated 3 or 4 ft above the barrel and falls on a top center line of the core barrel. Actual time of applying the sand is only about 10 seconds. A long strike removes the surplus sand from the barrel and leaves a smooth, straight core accurate to within a few thousandths of an inch.

The loam sand may be either natural or compounded. In some areas natural loam sand is available; in other areas artificial loam is compounded of various mixtures of fine sand, claywash and sharp sand and sawdust.

After the core has been made it is dried in an oven, removed and placed again in the bearings. A coating of thin loam slurry is spread over the surface of the revolving core to form a smooth surface. Usually the core is then black washed, but in any case the core is returned to the oven for a final drying.

Bronze Castings Leak Badly

QUESTION We make bronze castings of the 90 per cent Cu-10 per cent Sn composition for use in the sulphite department of a paper producer, and it is quite satisfactory. Recently we were asked to supply castings for a gas accumulator in the same department, and used the same composition. While the castings appeared perfect and did not show any flaws after machining, they leaked so badly they had to be removed from service. Castings were then tested at 80 psi air under water and bubbles were numerous, indicating that while the bronze might be all right for sulphite paper stock it was not much good with sulphur dioxide gas. Can you suggest a suitable composition for this application?

ANSWER Presumably the castings for the accumulator were not the same type as for the paper stock machines, and if the castings had been subjected to a pressure test previous to use, the leakage would have been observed. We suspect that the trouble is not due to the composition used, but rather to porosity caused either by gas pickup during melting or by improper gating.

Your mention that after machining the castings showed a good surface points to a feeding problem since gassy metal usually produces pinholes just under the casting skin. As far as a different composition is concerned, silicon bronze is recommended for resistance to sulphur dioxide. Composition range is 1 to 5 per cent Si, 1.5 per cent max Mn, 5 per cent max Zn, 2.5 per cent max Fe, 2.0 per cent max Sn, and remainder Cu.

Surface Is Poor for Plating

QUESTION We are sending you a small brass casting of bracket shape which is full of fine holes, as you will note from the polished and buffed surfaces. The casting later is chrome plated. We are using an oil-fired furnace holding a No. 90 crucible. Sand is all new No. 1 Albany, and the alloy is 83 per cent Cu, 4 per cent Sn, 6 per cent Pb and 7 per cent zinc. One-half pound of flux to 100 lb metal is added at the beginning of the heat. No deoxidizing agent is used. Four castings are made in a mold with the gating system in the form of the letter H, using a ½-in.-diam sprue in the center of the cross bar. The small ears on the underside of the casting are to be bent without breaking. If the composition of the alloy is not suitable can you suggest another?

ANSWER Cause of defects in polished and buffed specimens usually is difficult to determine since the polishing operation removes part of the surface, and the buffing operation with its compounds fills the holes and pits with a dark deposit. Fortunately, part of this casting was not polished and buffed, giving some idea of the as-cast surface. Casting was fractured in several sections to observe the structure, but as far as we can ascertain there was no evidence of a gassy condition. We did find some indication of oxide or dross just at the surface.

The as-cast surface appears somewhat rough, particularly with reference to the polishing, buffing and plating operations. We believe that the pinhole appearance is due to this roughness, in that the polishing operation does not cut down the surface sufficiently to get below the deepest pits left by the sand. We suggest that you take a buffed casting showing the bad surface, subject it to another polishing and buffing, and observe the results. How-

ever, polishing costs money, and you will be further ahead by providing as smooth as possible as-cast surface. Perhaps a finer grain sand may be necessary. Again it might be that more attention should be given to mixing or cutting over the sand since the surface roughness does not appear uniform. Also check your pouring temperature; it may be higher than necessary. High temperature increases fluidity of the alloy and its ability to follow the conformation of the sand.

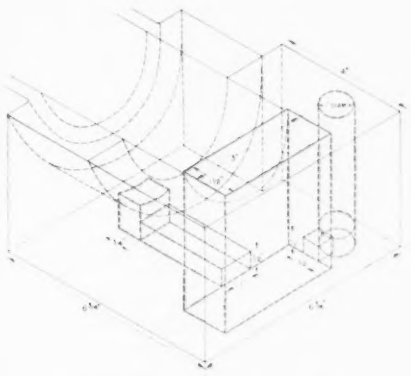
While this alloy possesses reasonable ductility—confirmed in the fracturing process—some surface distortion occurs in bending, depending upon degree of bend. You will have to experiment with the bending operation as practiced in manufacturing application to see if distortion occurs and its effect upon appearance of the surface. Possibly better results might be obtained with the 70 per cent Cu, 30 per cent zinc alloy often used for chandelier or lamp work. That alloy has high fluidity which enables pouring into thin sections. It also has high ductility, can be cast flat and when cold can be formed into curves and shapes without cracking.

Oxide Enters Casting Cavity

QUESTION We are having trouble in making some nickel-aluminum bronze sleeves about 3⅝ in. ID, 4⅜ OD and 15¼ in. long which are flanged at one end. Alloy contains 4 per cent Ni, 11 per cent Al and 4 per cent Mn, remainder Cu. We are unable to control the oxide although we tried several different ways to prevent turbulence which we control. We melt with natural gas and have poured and melted at four different temperatures of 1900, 2000, 2100 and 2200° F. Oxide is not consistently at the same place. It starts sometimes about 1 in. below the flask joint. We have used different fluxes. Furnace combustion tests show slight oxidizing flame. We also tried a reducing flame. We have made molds in green sand with and without black lead, skin dried and oven dried, No. 1 Albany sand, core sand (80 AFS fineness with 60 to 1 oil), same with 40 to 1 oil, needle vented all over connected to main vent. If you can make any suggestions on how to control the oxide, we will appreciate them.

ANSWER Important phase in making aluminum bronze as well as manganese bronze castings is to introduce the alloys into the casting cavity without turbulence so that the aluminum oxide envelope coating the molten stream is not broken. Usual way to do this is to place the gate at the lowest point so that the alloy flows up smoothly into the cavity. Also the gating system includes a trap or two to catch any dirt or dross that might be carried down the sprue.

Horn gating with the large end of



Applies principle of horn gating

the horn leading into the cavity is practiced to a large extent, but it is not always easy to apply the usual horn gate, and often it is necessary to employ a variation. We have indicated this in the accompanying sketch; the lower part of the gating system is formed in a core. The riser and sprue, of course, will extend up through the green sand cope. The gating core is in simple block form so that it can be made easily, and also dropped into a print counterpart attached to the pattern.

Also to help the metal flow smoothly into the mold cavity we suggest tilting the mold at an angle of about 20 degrees from the horizontal, with the gated end as the lowest point. With a 22-in. flask the opposite end would be elevated about 7¾ in., or 8½ in. with a 24-in. flask. When the riser is filled almost to the top, the block or support under the high end is knocked out and the pouring continued with the mold horizontal. Of course there should be no cessation of pouring when the block is being knocked out.

Best results in pouring any metal or alloy are secured when the lip or spout of the crucible or ladle is as close as possible to the sprue opening. This exposes the least amount of the metal stream to the atmosphere and also minimizes air entrainment into the stream. Still another method of keeping inclusions and drosses out of the mold cavity is to use a pouring basin and plug.

Low Conductivity in Casting

QUESTION Recently we had occasion to check our high-conductivity copper castings, selecting two small castings at random and a test bar poured under normal melting and casting procedure. All were tested in a compact unit of German make which indicates by contact conductivity by comparison with a master sample in the device. Casting 1 showed 75 per cent conductivity; No. 2 gave 91 per cent, and the test bar 90 per cent. Chemical analyses of the specimens indicated none contained silicon or phosphorus, and the iron was less than 0.01 per cent. Otherwise, the test bar showed 99.94 per cent Cu and 0.001 per cent Al; casting No. 2 gave 99.93 per cent Cu and 0.002 per cent Al, and No. 1 had 99.90 per cent Cu, and 0.003 per cent Al.

Castings were machined and did not show any defects, but were not x-rayed. Copper used is electrolytic in the form of ingots or cut-up anodes. It is melted in a stationary gas-fired furnace under oxidizing conditions in silicon carbide crucibles holding 280 lb. Approximately 6 oz calcium boride is placed at the bottom of the charge, and melted down with a cover placed on the crucible. We rarely have a gassed heat, and pour a small open riser block to see if the copper shrinks—a procedure we have used for years.

ANSWER While we are not familiar with the instrument used for determining conductivity, we assume that it was functioning properly according to the results obtained, and presumably the tests were conducted within a short period of each other. Also that the contact on the test giving the low result was checked to see that it was properly made. Then the possible cause of low conductivity is one of two things. First is that the cross-sectional area or weight per unit length of metal under test was low in comparison to the master specimen —for example, contained shrinks. That would result in higher resistance to passage of the electrical current, indicating that the test piece was of lower conductivity.

Second cause of low conductivity would be presence of some element which increases resistance to passage of electric current. Those include silicon, iron, aluminum and phosphorus, which are mentioned in the analyses, and additionally arsenic, tin, beryl-

lium, and probably some others. We do not have the time to make a thorough search of the literature relative to subversive elements in conductivity copper, but did find that the conductivity would be reduced to 75 per cent by the following—0.1 per cent As, 0.48 per cent Sn, 0.095 per cent Be, 0.042 per cent P, 0.06 per cent Si, 0.22 per cent Al, and 0.13 per cent Fe. Those refer to single elements as additions, and it is quite possible that combinations of smaller amounts of several would reduce conductivity as much as a larger quantity of one.

We note in the analyses given that the copper content (99.90 per cent) of the low-conductivity specimen is below that shown in those of higher conductivity (99.93 and 99.94 per cent). Hence, it is possible that the difference (0.03-0.04 per cent) may be some element or combination of elements causing the trouble. What those may be we do not know. Careful and painstaking procedures will be required to provide a complete accurate analysis.

Tubes Not Fed Sufficiently

QUESTION We are casting bronze tubes approximately 15 in. long and 4 in. in diam for use in industrial air conditioning units. They have to withstand steam under pressure up to 75 psi. Alloy contains 88 per cent Cu, 6½ per cent Sn, 1½ per cent Pb and 4 per cent Zn. We use an oil-fired pit type crucible furnace, and check temperatures with a pyrometer. When the tubes are machined there is no sign of porosity, but when they are put on test they leak. When the tubes are broken, the metal does not appear to be dense.

ANSWER Without a specimen to examine it is difficult to determine the cause of leakage in the bronze tubes. Based on your statement that no evidence of porosity is visible on the machined surface, our guess is that the trouble is lack of feed. You do not mention how the castings are gated, but we believe the best results will be obtained by standing the tubes or bushings on end and pouring through a ring of six pencil gates ¼-in. in diam. The gates should be equally spaced from each other and located so that they are midway between the inner and outer peripheries of the tubes.

Cavity should be increased in length a few inches to provide a feeding head. This may be done by increasing the length of the pattern or by drawing the pattern up the required distance in the mold after ramming up the lower portion. As an additional means of securing a solid section as well as a finer grain structure, you might try a cylindrical cast iron chill instead of a sand core to form the bore. For easy removal the metal core is split into four quadrants separated by thin strips of asbestos paper.

Pouring temperature will vary according to section thickness, and in the range ½ to 1 in. about 2125° F should serve satisfactorily. We assume that the melting operation is such that the alloy is relatively free from gases—or some indication would appear after machining.

Shrinking a Bushing in Place

QUESTION We will appreciate the following information pertaining to "dry ice freezing" in fitting a cast iron bushing into a pump cylinder. Bushing is 16½ in. OD, 15 in. ID, and 16 in. long. How long will it have to be kept in the dry ice, and what will be the shrinkage? We would like to be 0.0004 to 0.0005-in. tight in the cylinder.

ANSWER Thermal coefficient of expansion of gray iron from minus 191 to plus 16° C is 0.0000085 in. per in. per degree. On a diameter of 16½ in. that would mean a change in dimension of 0.00014025 in. per degree. Since you are cooling the casting the value would be contraction rather than expansion. Dry ice has a temperature of about minus 110° F at atmospheric pressure when surrounded by its own gas, but when changing from the solid to gaseous state the temperature may be as low as minus 135° F.

If we assume that the actual temperature is about midway in this range, or minus 120° F (minus 66.7° C), then the total contraction on the diameter of the bushing would be 0.00014025 times the temperature difference. Temperature difference would be the sum of room temperature and that below zero or say 20° C (68° F) plus 66.7. Then 0.00014025 times 86.7 equals 0.012259-in., the amount of contraction. In other words, if the bushing is placed in dry ice until it reaches a temperature of about minus 66.7° C it will be 16.4877 in. in diam instead of 16.5000 in., assuming of course that the machining is a close-tolerance operation.

You refer to the bushing being 0.0004 to 0.0005-in. tight in the cylinder. We assume you intend to turn the outside diam 16.5005, for example, and insert it into the cylinder, which is bored to 16.5000 in. Only suggestion we have is to bore the cylinder first and determine the dimension accurately. Then turn the bushing accurately to the oversize to provide the desired fit. Place the machined bushing in dry ice—preferably in a vertical position so that the ice can be placed inside as well as outside—and allow it to remain until the temperature is the same throughout. We do not know how long this will take, but presumably the value of one hour per inch of thickness used in heat treatment will apply to cooling as well.

Since the total contraction through cooling is about twice the dimensional fit allowance, possibly leaving the bushing in dry ice for one-half hour might be sufficient to permit insertion without difficulty in the cylinder. The only way to find out is to try the fit. If the contraction is not sufficient, place the bushing back in the ice until it will slip in place.

It might be pointed out that the bushing will shrink or contract in length as well as in diameter in cooling; remember this when inserting in the cylinder.

Cracking Develops in Casting

QUESTION We read your Question and Answer section each month, and thought you might be able to help us solve a problem relating to a zinc casting. The ashtray casting we are sending you is three or four years old and, you will note, shows severe cracking and distortion. The customer for whom this and others were made has had several returned. Metal used was 95 Zn-5 Al, and castings were made in slush molds. Customer supplied the metal, which sometimes is scrap, and we add the aluminum. We never have seen a casting crack or distort like this, and would like to know what is the cause.

ANSWER The zinc-base casting submitted for examination is a good example of accelerated growth and intergranular corrosion caused by the presence of small amounts of lead, cadmium or tin in the zinc-aluminum alloy. Specifications for zinc-base alloys for diecasting and for slush molding call for the following limitations: Pb—0.007 per cent max; Cd—0.005 per cent max, Sn—0.005 per cent max, and Fe—0.100 per cent max. Perhaps your customer supplying the zinc may not be aware that to eliminate the growth or distortion and intergranular corrosion or cracking, the subversive elements mentioned must be kept within the indicated maximum values.

Common method to determine whether the Pb, Cd and Sn contents of the zinc-base alloy exceed the limitations is the steam exposure test. The specimens or castings are subjected to steam vapor at 95° C (203° F) and under atmospheric pressure for 10 days. Growth and cracking developed under the test conditions usually means that it will show up in the castings in one to two years.

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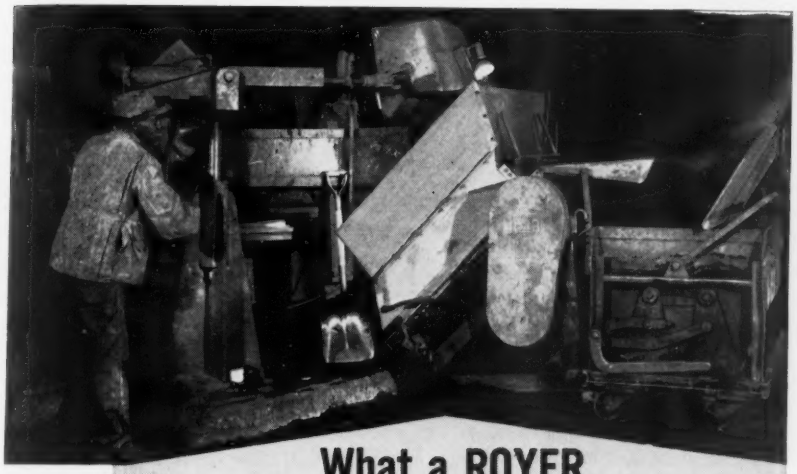
Finish it with a ROYER



Model NYS-E with a 9 ft. muller.

What a ROYER will do for your Mulled Sand

1. Increase permeability.
2. Increase flowability.
3. Eliminate all clay balls.
4. Provide a final complete mixing.
5. Double aerate the sand.
6. Speed cooling by fluffing, open discharge stream and open heap.
7. Assure a light, fluffy texture.

The mulling operation, designed to coat sand grains with certain additives by the mechanical process of kneading, is an essential one for good sand control. However, this action results in pressing and packing the sand grains together and the added bonding materials tends to hold the sand in a dense state. Sand properly prepared for molding should be open and fluffy, to allow for good flowability and the escape of gases. Sand discharged from ANY muller needs to be aerated . . . with a ROYER . . . the only machine large enough to handle the instantaneous discharge from large mullers; the only machine which fluffs and cools as it aerates.

Install a Royer directly under your muller discharge or later in the system, if more convenient. Two models are recommended for this application, depending upon capacities desired—the NRS, 40 to 60 tons per hour or the NYS, 120 to 180 tons per hour. With the addition of a Royer no time is added to the cycle of sand preparation and, for a fraction of a cent per ton, the quality of your sand will be improved many times over. Write for complete details.

A Model NRS in a Massachusetts foundry.

Foremost in Sand ROYER *Conditioning Equipment*

ROYER FOUNDRY & MACHINE CO. 159 PRINGLE ST. KINGSTON, PA.

MEN . . . of Industry

FRANKLIN R. HOADLEY
. . . retires, Farrel-Birmingham

FRANKLIN FARREL III
. . . Farrel-Birmingham pres.

FLOYD V. SNODGRASS
. . . Walworth Co. v. p.

EDWARD C. CONNER
. . . works mgr., Walworth Co.

FRANKLIN R. HOADLEY has retired as president, Farrel-Birmingham Co., Ansonia, Conn., a position he held since 1945. Following graduation from Yale University, his early experience was with Farrel-Foundry & Machine Co., which merged with Birmingham Iron Foundry Co. in 1927. He resigned as vice president of the Farrel organization in 1936 to become president, Atwood Machine Co., Stonington, Conn., and was named president of Farrel-Birmingham when it acquired the latter company. Mr. Hoadley is a past president of National Foundry Association and Gray Iron Founders' Society. **Franklin Farrel III** has succeeded Mr. Hoadley as president. He joined the company in 1933 after graduation from Yale University, and in 1944 became manager of the Connecticut plants. A year later he was named secretary and assistant to the president, and in 1950 was elected executive vice president. **Alton A. Cheney** was re-elected chairman of the board, and **Austin Kuhns,** chairman of the finance committee. New vice presidents include **Edward S. Coe Jr.,** manager of the Connecticut plants, who also will be assistant to the president; **Robert M. Honegger,** general manager of the Buffalo plant; and **Joseph LeMay,** who continues as treasurer. **Julius G. Day Jr.** was appointed as secretary-general counsel.

Arthur J. Zahn has been appointed employee relations manager, Foundry Division, Eaton Mfg. Co., Vassar, Mich. Mr. Zahn joined the company in 1950 as safety director and until recently was budget supervisor.

Floyd V. Snodgrass has been elected vice president-production, Walworth Co., New York. Until recently Mr. Snodgrass was works manager and assistant to the vice president of the Renton, Wash., plant, Pacific Car & Foundry Co. Previously he was associated with Nordstrom Valve Division, Rockwell Mfg. Co., in Oakland, Calif. **Edward C. Conner** has been appointed manager of Walworth's Greensburg, Pa., Works, succeeding **Carl F. Lundbom,** works manager since 1952, who has retired after 43 years of service. Mr. Conner was production control manager at the Greensburg Works, which he joined in 1928.

Harrison Weaver Jr., formerly director of engineering and chief engineer, has been named director of manufacturing, Brillion Iron Works Inc., Brillion, Wis. He joined the company 12 years ago. **John Haun,** assistant director of engineering, has been appointed director of engineering. Prior to joining the company in 1950 he was associated with Nash-Kelvinator Corp., Kenosha, Wis. Messrs. Weaver and Haun are graduates of Michigan College of Mining and Technology.

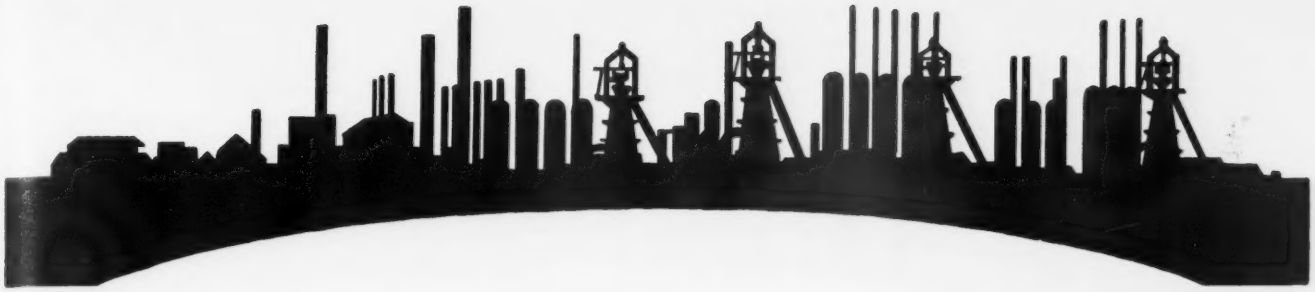
John G. Steinebach, formerly representative of the Chemical Division, Borden Co., New York, in Michigan and Indiana, has joined the engineering staff of A. P. Smith Mfg. Co., East Orange, N. J.

Harry E. Hillstrom has been transferred to the Chicago Works, Aluminum Co. of America, as chief metallurgist. **George A. Purdy** has succeeded Mr. Hillstrom as chief metallurgist of the sand foundry, Cleveland Works. **R. I. Else** of the Chicago Works metallurgy department will join the metallurgical staff of the Cleveland Works. Mr. Hillstrom joined Alcoa in 1940, became assistant plant metallurgist in the Cleveland sand foundry in 1945, and chief metallurgist in 1950. Mr. Purdy joined the Research Division in New Kensington, Pa., in 1946, and 4 years later was transferred to Cleveland Works metallurgical department.

Theodore Kauffman Jr. has been elected president, the S. Obermayer Co., Chicago, succeeding **Theodore Kauffman,** who has become chairman of the board. **George V. Campbell** has been named vice president in charge of the company's Ramtite Division, a position formerly held by Mr. Kauffman Jr. **Frank B. Flynn,** in charge of the Obermayer Division, was elected executive vice president of the company.

Harry J. Hemingway has been elected president, Advance Aluminum Castings Corp., Chicago, succeeding the late Roy W. Wilson. Mr. Hemingway is a former president and director of American Marietta Co., Chicago.

A. E. Tarr has been appointed assistant to the president, Leeds & Northrup Co., Philadelphia. **Harold L. Scutt** has succeeded him as manager of the sales engineering division. **Nathan Cohn** was named manager of the market development division, replacing **L. E. Emerich,** who



Greetings
to
the Members
of the
AMERICAN FOUNDRYMEN'S Society

on the occasion of their

59th Annual Convention

Houston, Texas
May 23-27, 1955

Woodward Iron Company

WOODWARD, ALABAMA

Producers of Foundry and Malleable Iron

Established 1882

ELMER E. BRAUN
. . . division production mgr.

CARL A. KOERNER
. . . division mfg. mgr., GMC

F. JAMES McDONALD
. . . division plant mgr, GMC

CHARLES E. DRURY
. . . factory mgr., Saginaw

recently became director of marketing. **H. Raymond Abey** has succeeded the late **A. Merrill Redding** as manager of the marketing services division. **J. William Robinson** has been named western sales manager, with headquarters in San Francisco.

Elmer E. Braun was appointed production manager, Central Foundry Division, General Motors Corp., Saginaw, Mich. He was graduated from General Motors Institute in 1933. **Carl A. Koerner** has succeeded Mr. Braun as manufacturing manager of division plants in Saginaw, Defiance, O., and Danville, Ill., with headquarters in Saginaw. He finished the institute course in 1938. **F. James McDonald** assumes Mr. Koerner's former position as manager of the Defiance plant. **Charles E. Drury** has been transferred from the Danville plant to succeed Mr. McDonald as factory manager at Saginaw. He joined the company in 1949. **Thomas E. Smith III** has been named factory manager of the Danville plant, succeeding Mr. Drury. He has been with the company since 1948. **Robert H. Cowan,** with the division since 1948, assumes Mr. Smith's former position as manufacturing superintendent at Danville. He was formerly superintendent of the gray iron foundry there.

J. Gordon Seiter has been named manager of the High Vacuum Division recently established by F. J. Stokes Machine Co., Philadelphia, to handle sale of vacuum metallizing equipment. **G. Jewett Crites** is manager of the Vacuum Processing Division, which will have charge of vacuum impregnating equipment sales. Mr. Seiter became head of vacuum metallizing sales in 1950. Mr. Crites joined the company in 1949 and since 1952 has been in charge of vacuum furnace sales. **Kendrick C. Taylor,** who joined the organization last year, will handle vacuum furnace sales.

J. P. Murphy has been transferred from the Chicago sales office to the sales development unit of Dow Chemical Co.'s Technical Service and Development, Midland, Mich., where he will handle sales of titanium. He joined the company in 1942 after graduation from Yale University, and was in the metallurgical laboratory until 1950. **R. E. TenHoor** has been appointed supervisor of the new industrial chemicals section of Technical Service and Development. A graduate of University of Michigan, he joined Dow's organic chemical sales staff in 1950 and was transferred to Technical Service in 1953.

Adm. Alan G. Kirk has been named chairman of the board of directors, Alloy Precision Castings Co., Cleveland. **James Laughlin** was elected secretary - treasurer, and **Theodore Hart,** assistant treasurer. **Ronald D. Gumbert** was re-elected president and chief executive officer. **Waldo Hatch, E. D. Hopper, Peter D. Kleist,** and Mr. Gumbert were elected directors. Adm. Kirk is also board chairman-president, and Mr. Gumbert, vice president, Mercast Corp., New York, which recently acquired Alloy Precision Castings Co.

Norman J. Henke was elected vice president-plant manager, Fanner Mfg. Co., Cleveland, succeeding **Vernon Hier,** resigned. Mr. Henke was formerly in charge of the company's chaplet division sales. A graduate of General Motors Institute, he was previously manufacturing manager for GMC foundries in Defiance, O., Saginaw, Mich., and Danville, Ill.

Fred Ebeling recently retired from W. W. Sly Mfg. Co., Cleveland, following 39 years with the company. As reported in April, **David E. Neustadt** has succeeded him as general sales manager, a position Mr. Ebeling held for 34 years. **Edward Falk,** for 18 years sales engineer for the company, has been named assistant sales manager.

Maurice K. Heartfield has been elected chairman of the board, Foundry Rubber Inc., Bethesda, Md. **John A. Sterrett** and **J. Douglas Rollow** continue as president and executive vice president, respectively, and **Maurice K. Heartfield Jr.** has been named vice president-sales.

John A. Fyffe has been appointed sales representative in the New York district office, Hooker Electrochemical Co., Niagara Falls, N. Y. Mr. Fyffe attended the Citadel and Rhode Island State College. Until recently he was engaged in sales for Metalsalts Corp., Hawthorne, N. J.

G. L. Teller has been named assistant purchasing agent of foundry products and supplies, Allis-Chalmers Mfg. Co., Milwaukee, succeeding **D. E. Bender,** who has become assistant purchasing agent of office equipment and supplies.

R. M. Ditmore, for 10 years associated with Federated Metals Division, American Smelting & Refining Co., New York, has joined the executive staff of Red Seal Metals Co., South Gate, Calif.

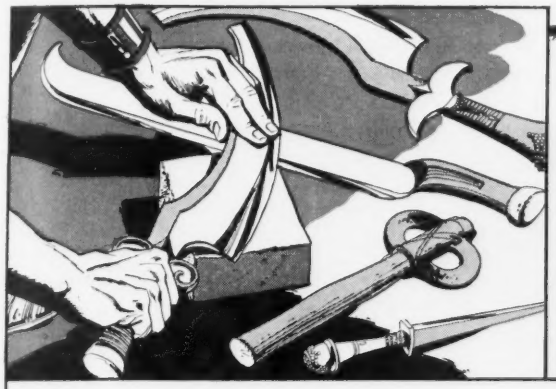
Nelson M. McGuire has been appointed assistant to the vice president-sales, American Manganese Steel Division, American Brake Shoe Co., Chicago Heights, Ill. Formerly assistant advertising manager for

NO. 2 OF A SERIES
ON THE HISTORY OF ABRASIVES
BY CHICAGO WHEEL & MFG. CO.

ABRASIVES WERE IMPORTANT
to the skilled craftsmen of early Egypt.....

The Egyptians are among the first people we meet in history, who, as early as 3000 B.C., were making pottery and glass, cultivating the land, and performing engineering achievements that continue to awe modern man. Let us see the part abrasives played in their way of life.

A NUMBER OF EGYPTIAN PYRAMIDS and monuments are still standing, some for over 5,000 years. They are built of stone which was polished in many cases to fit to hairline dimension. This polishing or abrading was done with stones globular in shape that were especially prepared for this purpose.



AS EARLY AS 6000 B.C. Egyptians were using copper in making weapons and utensils. Later bronze, iron, and even steel weapons were made. The edges of these weapons were carefully abraded and honed by a fine-grained sandstone, the forerunner of the famous whetstones. Egyptian paintings indicate that a special quality metal may have been used for the edges of their weapons.

BUTCHERS in the land of the Nile carried a "steel" or sharpening bar attached to their belts. This was used for quick-honing their knives. These "steels" as they are referred to throughout ancient history were bars of a sapphire-like stone. Thus we see the sharpening or finishing of metal is not a recent development. The Egyptians were well acquainted with this method of abrasion.

THE STATELY COLUMNS, pedestals and statues built by the Egyptians were shaped and finished by abrasion. Moreover, Egyptian artistry in working with precious stones and metals indicates a high degree of abrasive skill.

The array of abrasive products which Chicago Wheel & Mfg. Co. makes today would stagger the imagination of the ancient Egyptian craftsmen. Mounted points and grinding wheels engineered to each customer's requirement are a daily job here at Chicago Wheel. Perhaps we can help you cut cost on your abrasive and metal finish problems.

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Hanna T750 Fluid Power Cylinders

Air Operation to 250 psi, Hydraulic Operation to 750 psi

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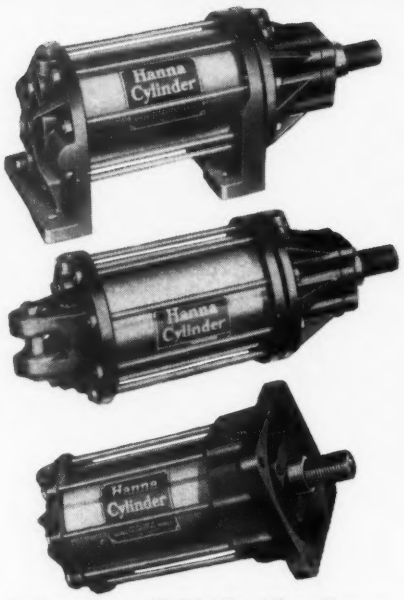

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Air or Hydraulic Operation to 110 psi

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Packaged As You Want It

■ "Good things come in small packages," it is said . . . so do Hanna Cylinders . . . and in medium and large packages, too. From the complete Hanna Cylinder line, up to 1,500 psi capacities, you can select a standard size and mounting style, with the power and stroke you need, to exactly suit your applications. Of course, you will be sure it's the finest cylinder for the job—because it's a Hanna. Well over fifty years of design and manufacturing experience guarantee that.

So, when you need reliable cylinders for products you make for resale, or for use in your own plant, consult a Hanna representative, or call on our plant engineers to help you find the most efficient answer to your problem. Also write us for technical literature.

Hanna HP Cylinders

Hydraulic Operation to 1,500 psi

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Hanna Engineering Works

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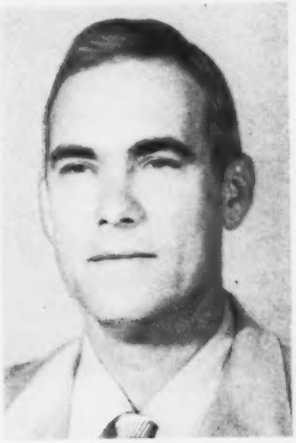
WILLIAM A. MORLEY
. . . Link-Belt plant supt.

DWIGHT H. RENFREW
. . . plant engineer, Link-Belt

CHARLES W. MOONEY
. . . foundry supt., Link-Belt



ROBERT J. REYNOLDS
. . . Texas A. & M. instructor

the National Bearing, Electro-Alloys, and American Manganese Steel Divisions, he will continue to handle advertising for the latter division in addition to new sales responsibilities.

Charles W. Mooney, since 1946 assistant superintendent, has been appointed superintendent of the Olney foundry, Link-Belt Co., Philadelphia. **William A. Morley,** who held that position previously, has been named general superintendent of the Link-Belt Philadelphia plant, succeeding **Dwight H. Renfrew,** who has become chief engineer. Mr. Mooney joined the Olney foundry in 1934 and was formerly metallurgist and supervisor of methods. Mr. Morley was assistant superintendent of foundry operations at one of the Chicago plants from 1940 to 1944, when he went to Philadelphia as Olney foundry superintendent. Mr. Renfrew joined the Indianapolis plant in 1929, transferring to the Philadelphia district office in 1939. He was general superintendent of Philadelphia operations since 1944.

Kenneth A. DeLonge has been placed in charge of the Iron and Nonferrous Castings Section, Development and Research Division, International Nickel Co., New York. A graduate of Michigan State College, he joined the Cast Iron Section of the company's research laboratory at Bayonne, N. J., in 1937. He was transferred to Development and Research Division at New York in 1940.

Stanley W. Moulton recently joined the engineering staff of Hitchiner Mfg. Co., Milford, N. H. A graduate of Massachusetts Institute of Technology, Mr. Moulton formerly was chief engineer, Midwest Precision Castings Co., Cleveland.

A. J. Van Harn has been appointed general manager, Grindle Corp., Harvey, Ill., and will fill the vacancy on the board of directors caused by the recent death of the former president, A. J. Grindle. Mr. Van Harn joined the company last year as executive assistant to Mr. Grindle. **J. Donaldson** and **C. H. Vennetti** will assist Mr. Van Harn as sales, engineering and financial assistants. **J. H. Gougler,** executive vice president, will head the engineering department, and **L. W. Olsen** will be in charge of purchasing and estimating for the company.

Robert J. Reynolds was recently appointed foundry instructor, Department of Mechanical Engineering, Agricultural and Mechanical College of Texas, College Station, Tex. Mr. Reynolds was the former owner of Mackay Foundry Co., Lufkin, Tex.

W. C. Hillman Jr. has been named to the newly created position of manager of coke sales, Pittsburgh Coke & Chemical Co., Pittsburgh. A graduate of Emory and Henry College, Mr. Hillman was formerly associated with Kerchner-Marshall & Co., Pittsburgh.

Dallas M. Marsh has been appointed assistant foundry superintendent, Cooper-Bessemer Corp., Mount Vernon, O. A graduate of Ohio State University, he was formerly engaged

KENNETH A. DeLONGE
. . . castings research, INCO

A. J. VAN HARN
. . . general mgr., Grindle Corp.

W. C. HILLMAN JR.
. . . Pittsburgh Coke sales

DALLAS M. MARSH
. . . assistant foundry supt.

MEN OF INDUSTRY

GEORGE E. FARREN
. . . Norton sales, Hartford

E. L. A. WHITAKER
. . . becomes general mgr.

JOEL BURNETTE
. . . Bartlett & Snow sales

EDWARD C. BLOOMBERG
. . . Monarch Aluminum pres.

in research and development work with high strength gray iron and nodular iron for the company.

George E. Farren recently was appointed field engineer in the Hartford, Conn., district for Norton Co., Worcester, Mass. Mr. Farren was graduated from University of Connecticut and prior to joining the company last year, was sales representative, Sullivan Tool & Supply Inc., Hartford, a Norton distributor.

C. M. Basile has been appointed vice president-manufacturing and sales, and **Gordon W. Rowand,** sales manager, Link-Belt Speeder Corp., Cedar Rapids, Iowa. Mr. Basile had been vice president-operations at Link-Belt Speeder Corp. since 1950, when he was transferred to Cedar Rapids from Link-Belt Co., Chicago, the parent firm. Mr. Rowand joined Link-Belt Speeder Corp. in 1946 and became assistant sales manager in 1953.

James H. Farnell has been appointed technical sales engineer, Louthan Mfg. Co., East Liverpool, O., subsidiary of Ferro Corp., Cleveland. A graduate of University of Toronto, he was formerly associated with Sprague Electric Co., North Adams, Mass.

Dr. William L. Faith was elected vice president-chief engineer of the board of trustees, Air Pollution Foundation, Los Angeles. He was named deputy director and chief engineer of the foundation when it was organized a year ago.

Milton Harmon was appointed eastern representative, Cast-Master Inc., Cleveland, with headquarters in Milford, Conn. He was formerly engaged in production of die casting machines at the company's Cleveland plant.

E. L. A. Whitaker was named general manager, Simplicity Materials Handling Ltd., a Canadian subsidiary recently established in Guelph, Ont., by Simplicity Engineering Co., Durand, Mich. Until recently Mr. Whitaker was industrial commissioner of Guelph.

Joel Burnette, until recently associated with F. K. Minor, Cleveland, manufacturers' representative for dust collecting and air filter equipment, was appointed sales engineer in the foundry sales department, C. O. Bartlett & Snow Co., Cleveland. A graduate of Case Institute of Technology, previously he was connected with Wilson Foundry Machine Co., Pontiac, Mich., and Claude B. Schneible Co., Detroit.

Gordon Kiddoo was elected vice president-development, National Research Corp., Cambridge, Mass. A graduate of Cornell University, he joined the company 4 years ago, and was director of the development department for the last 3 years.

H. W. Ufer, operating manager, **E. L. Williams,** sales secretary, and **F. H. Tout,** eastern sales manager, Griffin Wheel Co., Chicago, were honored recently by fellow employees upon their retirement after more than 50 years with the company.

C. E. Barner has been named assistant sales manager of the Western division, American MonoRail Co., Cleveland. **George H. Gerding,** formerly Philadelphia district sales engineer, has succeeded Mr. Barner as Chicago district manager.

John Srawley, formerly with Meehanite Metal Corp., New Rochelle, N. Y., has been appointed standards engineer, Arwood Precision Casting Corp., Brooklyn, N. Y.

Edward C. Bloomberg was elected president, Monarch Aluminum Mfg. Co., Cleveland, succeeding the late Raymond Deutsch. Mr. Bloomberg attended Ohio State University and joined Monarch Aluminum in 1943. He became treasurer in 1947 and the following year was elected executive vice president-treasurer. He is active in committee work of the Aluminum Association.

John W. Stevens, until recently general sales manager, Chemical Division, Celanese Corp. of America, New York, has been named vice president-sales, Reichhold Chemicals Inc., White Plains, N. Y. A graduate of Princeton University, Mr. Stevens was previously associated with American Cyanamid Co., New York.

Clinton A. Braidwood, since 1952 assistant director of research, Schenectady Resins, Division of Schenectady Varnish Co., Schenectady, N. Y., has been named director of development. A graduate of Michigan State College, he joined the company in 1949, after 7 years with Reichhold Chemicals Inc., White Plains, N. Y.

John Slezak has resigned as president of Turner Brass Works, Sycamore, Ill., a position he held since 1940. During World War II he served in Army Ordnance Corps, retiring with the commission of colonel. He was undersecretary of the Army from December, 1953, until early this year when he resigned.

L. C. Holloman Jr., formerly assistant regional manager, was appointed manager of the central sales region, Hewitt-Robins Inc., Stamford, Conn., with headquarters in Chicago, succeeding **Lester D. Bigelow,** who recently retired. A graduate of Southwestern College, Mr.

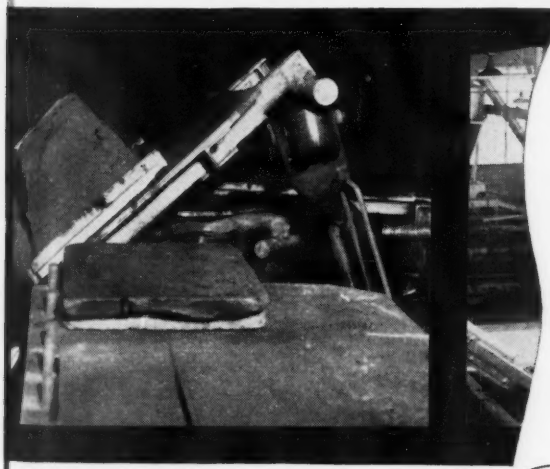
no matter which way you move JEFFREY belongs in the picture

LIFT IT UP
APRON CASTINGS CONVEYOR

LET IT DOWN
MOLDERS HOPPERS

CONVEY IT ACROSS
SAND HANDLING BELT CONVEYOR

WHEEL IT AROUND
UNIVERSAL MOLD CONVEYOR



DUMP IT
AUTOMATIC MOLD DUMPER

Today's featured performer in any foundry action scene is Jeffrey. You can't beat experience . . . and Jeffrey handling equipment has been tried, tested and proved in hundreds of foundries . . . every kind . . . every size . . . for years and years.

Most improved, cost-cutting methods have been Jeffrey engineered. So give us your problem, whether it involves a complete system or a single unit for a particular handling step. Comparison will prove Jeffrey belongs in your moving picture.

Write for Jeffrey Catalog No. 845

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. FEMA

THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

Columbus 16, Ohio

sales offices and distributors in principal cities

PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

IF IT'S MINED, PROCESSED OR MOVED
. . . IT'S A JOB FOR JEFFREY!

Holloman joined the company in 1940, and served as field engineer in Houston, Tex., and Tulsa, Okla. He became assistant manager of the South central sales division in 1952.

T. B. Sturges recently was appointed West Coast regional manager, Lamson Corp., Syracuse, N. Y., with headquarters in San Francisco, where he will be responsible for sales activities and for operation of the company's branch plant there. **A. S. Asquith** was named assistant West Coast regional manager. **Allen P. Cook** and **C. Don McNutt** have been appointed field engineers in the San Francisco area.

Laurence G. Holfelder and **James A. Coleman** have been appointed abrasive engineers, Norton Co., Worcester, Mass., in the central Indiana and Kansas City, Mo., territories, respectively. **Raymond B. Goodale** has been made field engineer in the Chicago district office. **William A. Simonds** will cover northern Texas and **Paul B. Foxwell** southern Texas.

Elbe W. Deck, formerly vice president-works manager, Wico Electric Co., West Springfield, Mass., was recently elected vice president-production, Lunkenheimer Co., Cincinnati.

John A. Dahlem has joined the sales staff of Syntron St. Louis Sales Co., representative of Syntron Co., Homer City, Pa., in the St. Louis area.

Gerald A. Conger, Rodney L. Sonnenberg and **Chris A. Zanison** have organized C & S Products Co., 14841 Meyers Rd., Detroit 27, for the manufacture of shell core and mold blowing equipment, and consultation service in shell molding. Until recently Mr. Conger was general manager, and Mr. Sonnenberg, foundry engineer, Cambria Foundry & Engineering Division, Stevens Mfg. Co., Ebensburg, Pa. Mr. Zanison was associated with Mechanical Handling Systems Inc., Detroit.

GLENN HUGHES, named chief of the Castings Branch, Iron & Steel Division, Business & Defense Services Administration, Washington, as reported in April

Donald J. Zeigler has been appointed Pittsburgh district sales manager for the Wright Hoist and Ford Chain Block Divisions, American Chain & Cable Co., New York. A graduate of Bucknell University, he joined the company in 1952 and until recently represented the two divisions in the Southwest.

Eugene R. Hoff has been promoted from warehouse sales manager to New York district sales manager, Laclede-Christy Co., Division of H. K. Porter Co., St. Louis.

Carl T. Zinsmeister, secretary, United Engineering & Foundry Co., Pittsburgh, has been named a director. He joined the company in 1912.

James L. Duchene has been appointed sales engineer for iron and bronze foundry products, Baldwin-Lima-Hamilton Corp., Philadelphia. With headquarters in the company's Pittsburgh office he will cover western Pennsylvania, northern West Virginia, and southern Ohio. A graduate of University of Pittsburgh, Mr. Duchene was formerly sales representative, National Bearing Division, American Brake Shoe Co., New York.

Vincent A. Syriac, formerly sales manager, Springfield Cast Products Inc., Springfield, Mass., was appointed sales representative in several eastern states for Kindt-Collins Co., Cleveland. **Herbert E. Wright** has been transferred to Milwaukee as branch manager.

R. K. Rawlins, until recently engaged in sales in the home office of Lindberg Engineering Co., Chicago, has been appointed district manager of the Texas-Louisiana area with offices in Dallas, Tex. He succeeds **William A. Hammer,** who has joined Dominy Heat Treating Corp., Dallas.

W. D. Bryson was appointed manager of Manufacturing Research, International Harvester Co., Chicago, succeeding **J. W. Armour,** who retired after more than 30 years with the company.

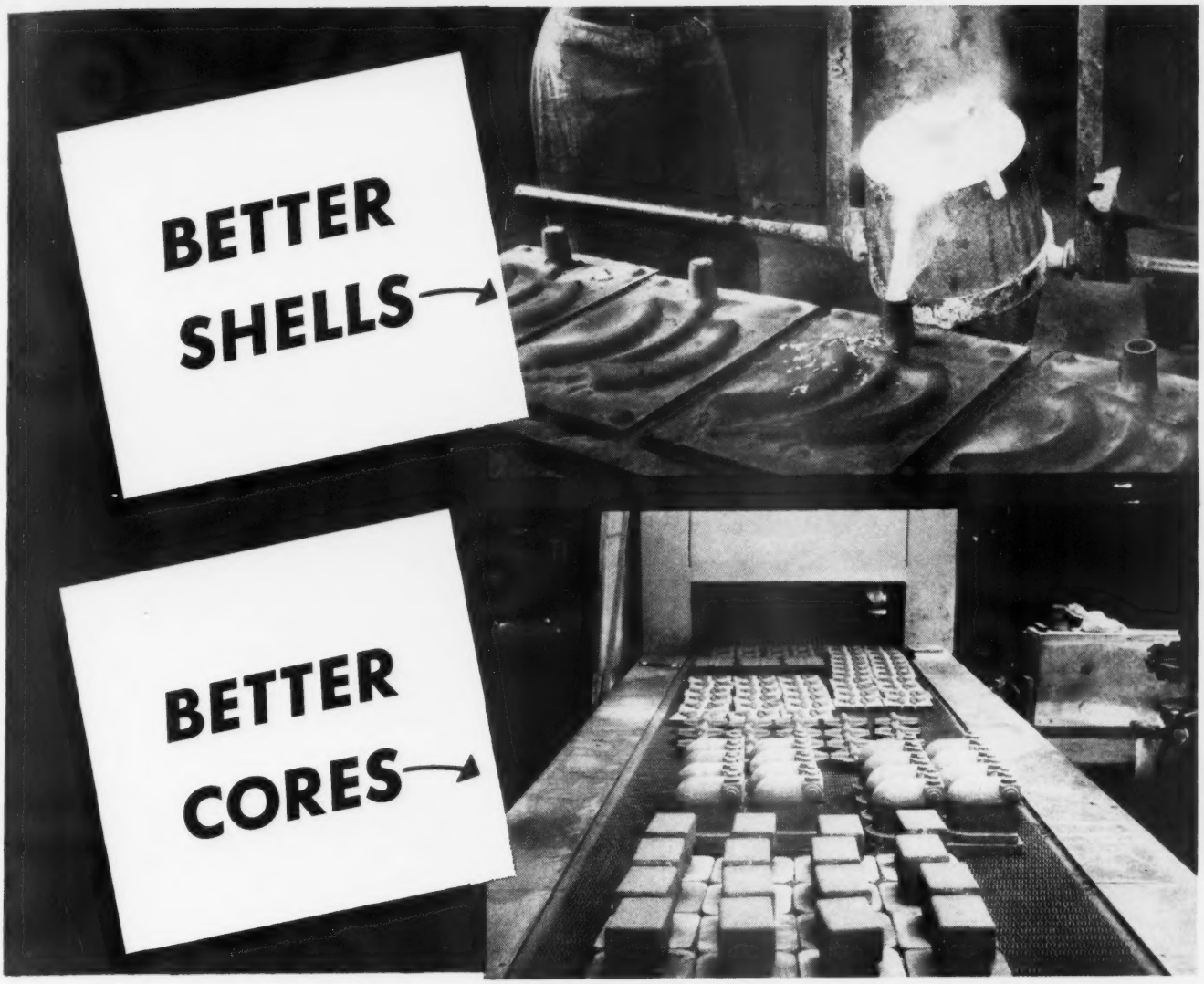
Joseph V. Rozycki was appointed manager of a new district office recently opened by Whiting Corp. (Canada) Ltd., Toronto, Ont., at 660 St. Catherine St., West, Montreal 2, Que. A graduate of University of Toronto, he has been with the company's Canadian branch for 3 years. **J. Noel Pierce** was appointed assistant district manager of the Montreal office.

GERALD A. CONGER
. . . shell mold consultant

RODNEY L. SONNENBERG
. . . shell core equipment

CHRIS A. ZANISON
. . . engineering service

JOSEPH V. ROZYCKI
. . . heads Canadian office



Pouring brass into shell molds above, and at bottom, cores moving into dielectric oven at Bronx Brass Foundry.

when you combine modern equipment with modern BORDEN RESINS

Modern foundry equipment . . . just like a modern automobile . . . performs best when used in conjunction with modern materials. And whether you're making shell molds or cores . . . the modern foundry resins come from Borden.

For shell molds—Borden's Thor MCF-7 resin assures a full-thickness build up, even on vertical pattern surfaces. It produces a flat, rigid shell without warpage. And it strips off the pattern cleanly and easily.

Jack Friedman of Bronx Brass Foundry installed the above dielectric core equipment last year, for use with modern Borden resin core binders. Says Mr. Friedman, "More efficient operation of our core department has paid for this equipment in less than a year."

In all efficient baking equipment, Borden's resin core binders assure clean, smooth-cored surfaces—help reduce scrap. They speed production, too, through faster bake-out . . . assure easier shake-out . . . contain no volatiles to gum up oven interiors . . . and minimize smoke so that working conditions are better.

If you want to get the most out of your foundry equipment, let a Borden engineer help you get better results in less time. Write The Borden Company, Chemical Division, Dept. F-55, 350 Madison Ave., New York 17, N. Y.

Urea and Phenolic Resin Core Binders . . . Shell Mold Resins . . . Core Spray . . . Core Paste . . . Parting Agents

FOUNDRY RESINS

THE *Borden* COMPANY

CHEMICAL DIVISION

Board of directors, Steel Founders' Society of America, for 1955 includes: standing—A. S. Trowbridge, Diebert, Bancroft & Ross Co. Ltd.; J. L. V. Bonney Jr., Bonney-Floyd Co.; T. F. Dorsey, Pittsburgh Steel Foundry Corp.; W. D. Bailey Jr., Westlectric Castings Inc.; H. F. Park Jr., General Steel Castings Corp.; A. T. McKee, Strong Steel Foundry Co. Seated—H. L. McClees, Crucible Steel Casting Co.; A. J. McDonald, American Steel Foundries; G. W. Myers, Crucible Steel Casting Corp.

Technical and Management Subjects Discussed at

STEEL FOUNDERS' MEETING

By FRANK G. STEINEBACH
Editor
and WILLIAM G. GUDE
Managing Editor

TECHNICAL and management subjects both received attention at the 53rd annual meeting of the Steel Founders' Society of America held at the Drake Hotel, Chicago, Mar. 14-15.

The meeting was presided over by A. J. McDonald, vice president, American Steel Foundries, who was elected to serve a third term as president of the society. Mr. McDonald, in charge of the Washington office of American Steel Foundries, with which he has been associated since 1939, was chief of the Castings Section, Iron and Steel Division, National Production Authority, during the three years ended December, 1952.

New vice president of the society is H. L. McClees, president, Crucible Steel Casting Co., Lansdowne, Pa. Mr. McClees joined that company in 1918, was made secretary in 1936 and president in 1943. F. Kermit Donaldson continues as executive vice president at the Cleveland headquarters.

Elected to the society's board of directors were: A. T. McKee, vice president-sales, Strong Steel Foundry Co., Buffalo; T. F. Dorsey, president, Pittsburgh Steel Foundry Corp., Glassport, Pa.; G. W. Myers, president, Crucible Steel Casting Corp., Milwaukee, and W. D. Bailey Jr., vice president and general manager, Westlectric Castings Inc., Los Angeles.

ROSS L. GILMORE
Lorenz Medalist

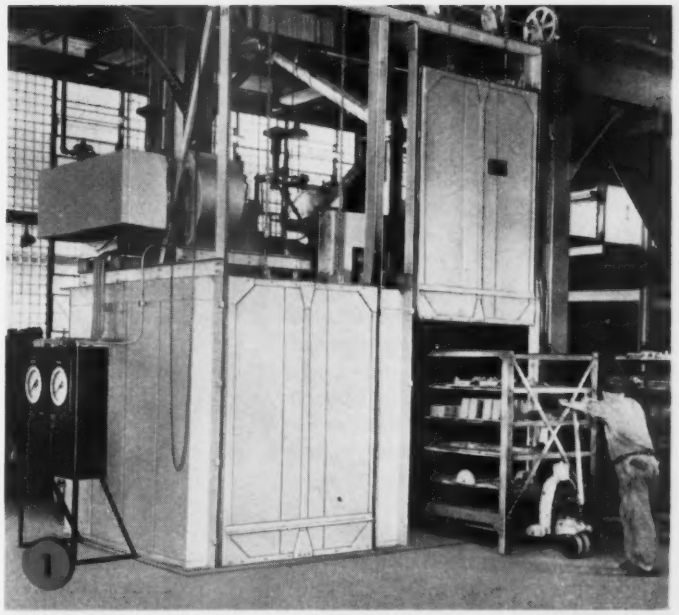
In opening the meeting, Mr. McDonald touched briefly on principal activities of the society during the past year. He said that about $50,000 would be spent on technical research this year. Committee changes include formation of a new Market Research Committee and disbanding of the national Personnel and Research Fund Committees.

The society's staff was enlarged with the appointments of George K. Dreher as secretary and Robert A. Willey as assistant technical and research director. Three new society publications were started—a quarterly devoted to steel casting research, a management letter and one concerning business trends. Speaking of market trends, Mr. Mc-

carl mayer CAN DO IT

That's right, for any baking requirement there's a Carl Mayer oven that will do the job faster and cheaper, to give you the efficiency so necessary in today's competitive markets.

The exclusive heat recirculation and slotted panel construction features cut fuel costs and heating times by as much as 50%. Uniform temperatures, assured by heat recirculation, guarantee perfect baking conditions throughout the entire oven.



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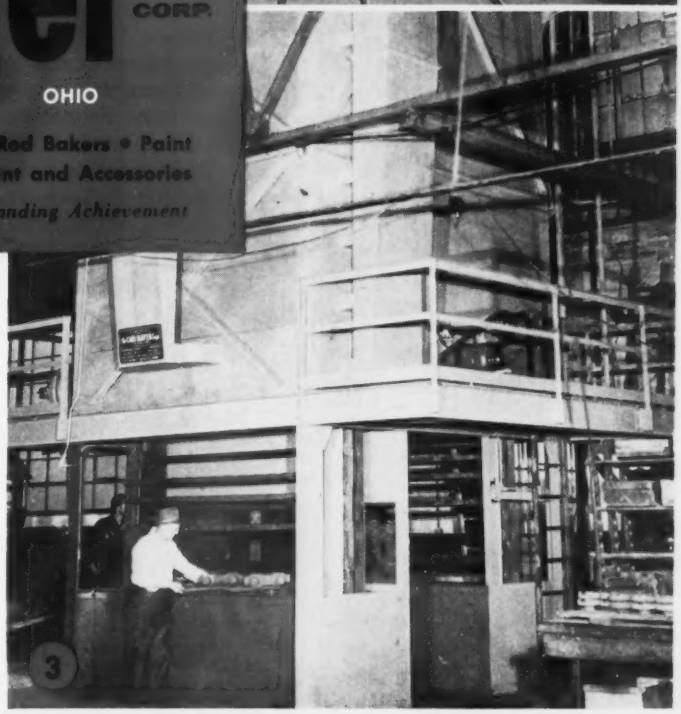
3030 EUCLID AVENUE CLEVELAND 15, OHIO

OTHER PRODUCTS: Heat Treating Ovens and Furnaces • Rod Bakers • Paint and Ceramic Drying Ovens • Special Processing Equipment and Accessories

Recipient of the "Trinks" Industrial Heating Award for Outstanding Achievement

Hundreds of modern foundries of all sizes have found the efficiency and economy of Carl Mayer ovens pay off. Find out for yourself. Our engineers will be happy to consult with you on your particular problem.

1. This rack type oven, with heat recirculation, holds temperatures within ±5° throughout the oven.
2. Patented downdraft heating method on this car type oven increases efficiency up to 50%.
3. This vertical oven features the patented internal heat fan — increases efficiency, lowers maintenance cost.



Donald said that steel castings orders reached nearly 63 per cent of maximum demand in January, compared with an average of less than 39 per cent for 1954.

R. G. Parks, National Malleable & Steel Castings Co., Cleveland, who was re-elected treasurer of the society, reported on its sound financial condition.

Charles W. Briggs, technical and research director, gave an interesting discussion of some developments in steel foundry research and of work that lies ahead. He said that the society spent about one-half million dollars during the last ten years on research covering thirty projects which have been completed. Ten more projects are in process.

Areas in which Mr. Briggs indicated more research is needed include methods of deoxidation, gating, metal solidification and bonding quality of clays. He described shell molding as a step toward an improved molding process and suggested that ceramic molding may provide the best molding medium for special types of castings, such as aircraft parts. He also mentioned the possibility that a fine sand combined with an air-setting bond and actuated by catalytic agents may be the principal green sand molding mixture of tomorrow. Chemical cleaning of castings and use of supersonic devices for inspection of large castings are other practices touched on by the speakers as having favorable prospects for broader application.

Important points brought out in various of the entries in the society's product development contest were discussed by George K. Dreher, secretary. These included savings in cost and weight in conversion from other types of fabrication; the providing of resistance to erosion, corrosion and thermal fatigue, and the use of chills to eliminate gas porosity at the casting surface. He pointed out that the use of wood, wax or plaster of Paris mockups of the part in question is helpful in selling users on the conversion to a steel casting.

Annual awards of the Steel Founders' Society were made at the Monday luncheon meeting. Ross L. Gilmore, president and general manager, Superior Steel & Malleable Castings Co., Benton Harbor, Mich., was presented the Lorenz Memorial Gold Medal in recognition of his years of service to the industry and the society. Mr. Gilmore has been associated with Superior since his graduation from the University of Michigan. In addition to his activities on various committees and as a director of the society, he is also a director of the Malleable Founders' Society.

Prizes for the best articles published last year in *Steel Foundry Facts* were presented by Robert C. Wood, president, Minneapolis Electric Steel Castings Co., and chairman of the Technical and Operating Committee. First prize went jointly to V. E. Zang and G. J. Grott, Unitcast Corp., Toledo, O., and second prize to B. C. Yearley, National Malleable & Steel Castings Co., Cleveland.

SFSA Officers. Standing: George K. Dreher, secretary. Seated: Charles W. Briggs, technical and research director; A. J. McDonald, American Steel Foundries, re-elected president of the society, and R. G. Parks, National Malleable & Steel Castings Co., who was re-elected to be treasurer of the group

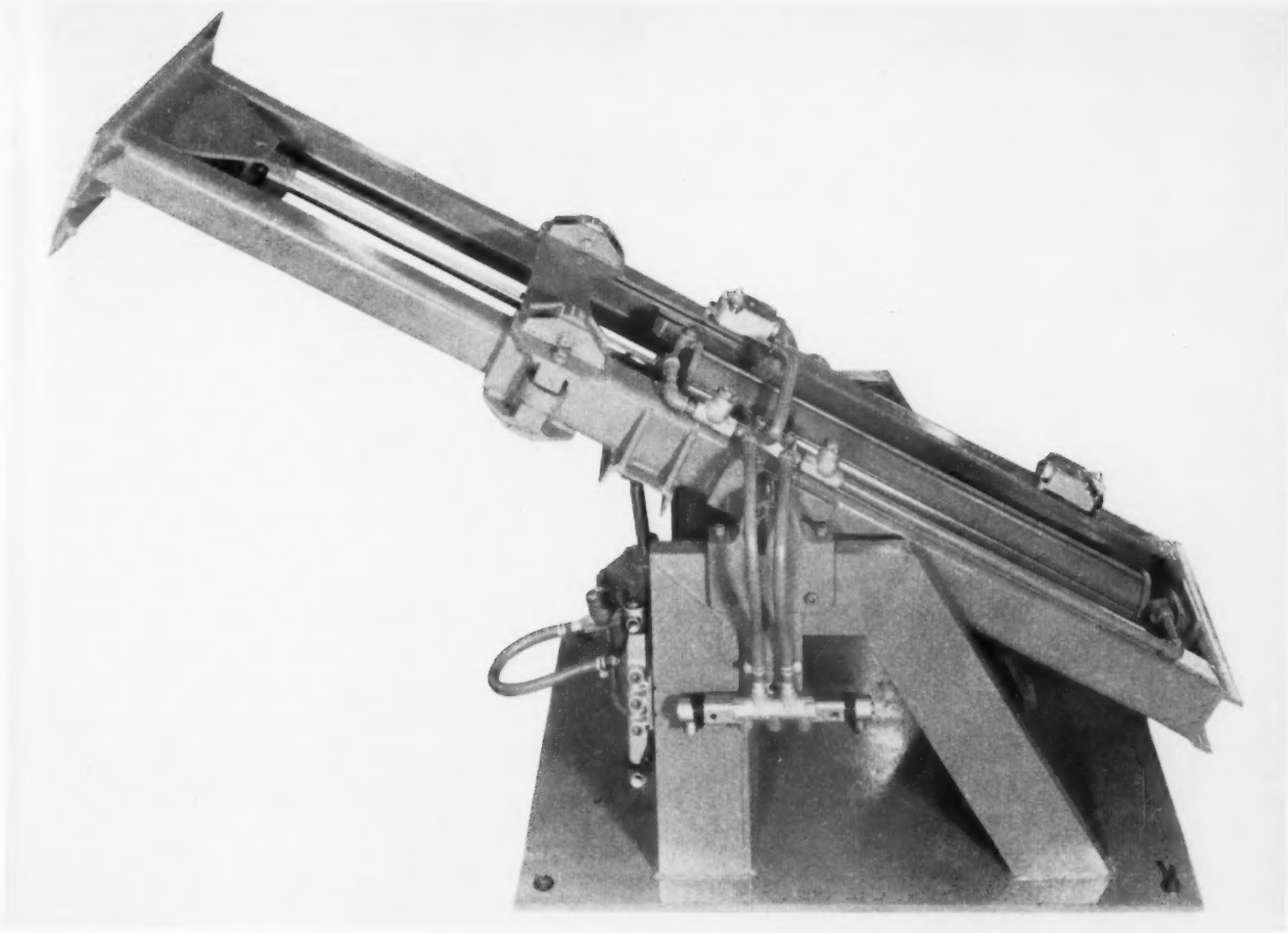
The outstanding safety improvement record of the steel castings industry was detailed by E. M. Layman, Safety Committee chairman who is director of personnel, General Steel Castings Corp., Granite City, Ill. The accident frequency rate of society members last year was at a new low of 16.2, compared with 19.2 in 1953, 23.9 in 1952 and 28.9 in 1951. Severity dropped from 1.1 in 1953 to 0.9 last year; this compares with 1.9 in 1951.

These seven foundries had no lost-time accidents in 1954: Deemer Steel Casting Co., New Castle, Del.; Worthington Corp., Harrison, N. J.; Eastern Malleable Iron Co., Wilmington, Del.; Weatherly Steel Castings Co., Weatherly, Pa.; American Hoist & Derrick Co., St. Paul; National Supply Co., Torrance, Calif.; Pacific Steel Casting Co., Berkeley, Calif.

Teams Must Be Built

In discussing the development of managerial talent, Dr. Elliott P. Janney of Rohrer, Hibler & Replogle, Cleveland, said that coaching those in the lower ranks is the most important role of top management. The best ball teams are built, not bought, he added. Foundries have an asset when seeking new talent in that their relatively small size offers certain opportunities not present in the largest companies. An elaborate training program is not desirable, the speaker stated, but the trainee benefits when he sees he is contributing to production and profits.

A review of activities of the Foundry Educational Foundation was presented by Edward J. Walsh, executive director, FEF. Mr. Walsh pointed out that the foundry industry needs more than a thousand new engineers each year to offset normal losses and that engineering schools offer the primary source of this manpower. To help provide these engineers, the FEF during the eight years of its existence has been instrumental in these accomplishments at the 14 co-operating engineering schools: Addition of $1½ million to value of foundry laboratories, $80,700 direct from foundation funds; increase from 11 to 55 full-time men teaching foundry subjects; increase from 14 to 105 courses in cast metals subjects; 55 engineering departments now require students to study foundry subjects, against 16 in 1947, thus covering more than 6000 students. Familiarizing the student with cast metal products—whether or not he enters the foundry industry—is a most important role of the



"BIG STORY" LEADS TO *BIGGER SAVINGS*

Automatic Pusher Has a 6-Second Cycle

ACM "PUSHER" is designed to cut labor costs in handling molds, flasks or castings in automatic or semi-automatic foundry operations. Dust-proof solenoid valves, actuated by movement of a conveyor, position of molds or other motivating devices, automatically control action of the pusher. Manual control also is possible. Operating cycle begins with pusher in horizontal, retracted position. Control devices activate an air cylinder which moves the mold or casting. As the pusher blade moves over the conveyor, a wiper blade attachment removes any sand which may have accumulated on the conveyor.

At the end of the forward stroke, controls cause a second air cylinder to raise the pushing mechanism into an inclined position (as shown above) to avoid possible interference with approaching molds or flasks. Pusher then retracts in anticipation of the next pushing cycle. When pusher is retracted at end of its return stroke, it returns to a horizontal position to await the signal for the next cycle of operation. Cycling speed can be as fast as one stroke every six seconds.

Standard designs have a pushing force of 1200 lb, which can be modified to meet individual conditions. Several types of control equipment are available. A safety feature automatically raises the pusher to the inclined position in case of power system failure. The machine is manufactured by Air Compressors & Motors Inc., 3501 Croton Ave., Cleveland 15, O.

"ACM 'Pusher' pays for itself in 6 months with manpower savings alone," claims early user.

Recently, the "BIG STORY" (left) was published. Already, new "Pushers" in many of the world's largest mechanized foundries are chalking-up even *bigger savings.* Flexible, automatic, ACM "Pusher" adapts to your mechanized foundry. Eliminate bottlenecks, smooth production—get the facts. Sorry, literature unfinished. For complete *proposal* "tailored" to your needs . . .

Send following details

★ Conveyor height, width and speed.
★ Mold size, weight and spacing.
★ Car length, Shakeout dimensions.
★ Bottom board height.

Your detailed specifications (above) assure you an accurate estimate.

No obligation. Write today.

Air Compressors & Motors Inc.

3501 Croton Ave., Cleveland 15, O., HE 2-1872

WINNERS in the product development contest of the Steel Founders' Society of America received their awards at the recent annual meeting. Standing, left to right, are: Vernon Lich, General Steel Casting Corp.; David P. Miller and Sands G. Falk, the Falk Corp.; Roy W. Daub, Lebanon Steel Foundry; Robert J. Frank, Superior Steel & Malleable Castings Co. Seated are Ross L. Gilmore, chairman of the society's National Product Development Committee, and A. J. McDonald, who was re-elected to a third term

FEF program, Mr. Walsh stated.

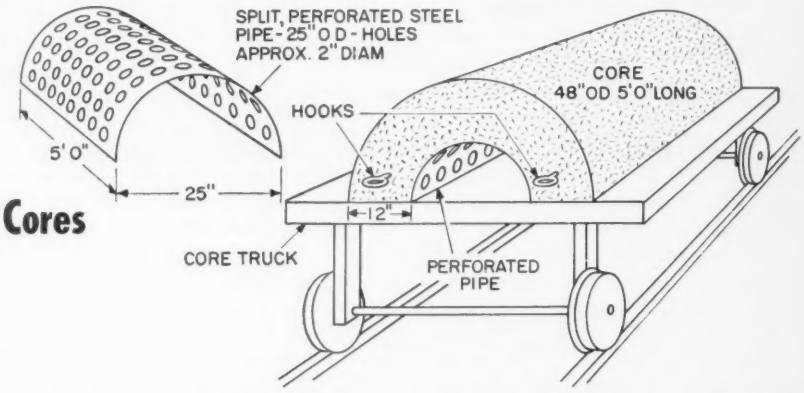
Last year 162 engineers were placed in the foundry industry from the FEF schools and about the same number from other schools co-operating in the foundation's placement service. The present total of 14 FEF schools is expected to be enlarged by the addition of the University of California, University of Kentucky, University of Illinois and possibly a Texas school.

Foundrymen must take the progress in nuclear energy seriously, according to Dean Clem J. Freund, College of Engineering, University of Detroit. Application of reactors to industry will require new concepts in materials. As an example, he suggested the possibility of providing steel castings about ¼-in. thick and of a metallurgical structure permitting substitution for heavy concrete needed to shield the radiation. While this may be considered fantastic, the dean pointed out that everything is fantastic until somebody does it. Research will help to develop a steel to stop nuclear radiation, but if it fails to find such a steel, it will find something else of value.

Dean Freund suggested that the industry look into solid state physics. As possible future markets, he pointed to the developments in calculating machines, the needs for metal capable of bridging the thermal barrier, and the importance of the trucking industry. To meet the challenge of the future, foundries need more young engineers, for, in his opinion, no industry or no plant can long serve without trained engineering brains. Dean Freund paid tribute to the foundry industry as the only one with a wide university-industry project at the undergraduate level provided by FEF.

In discussing "Design—Key to Broader Markets," Colin Carmichael, editor, *Machine Design,* Cleveland, emphasized the fact that the design

HOW TO DO IT



Quick Method of Making Cores Saves Time and Material

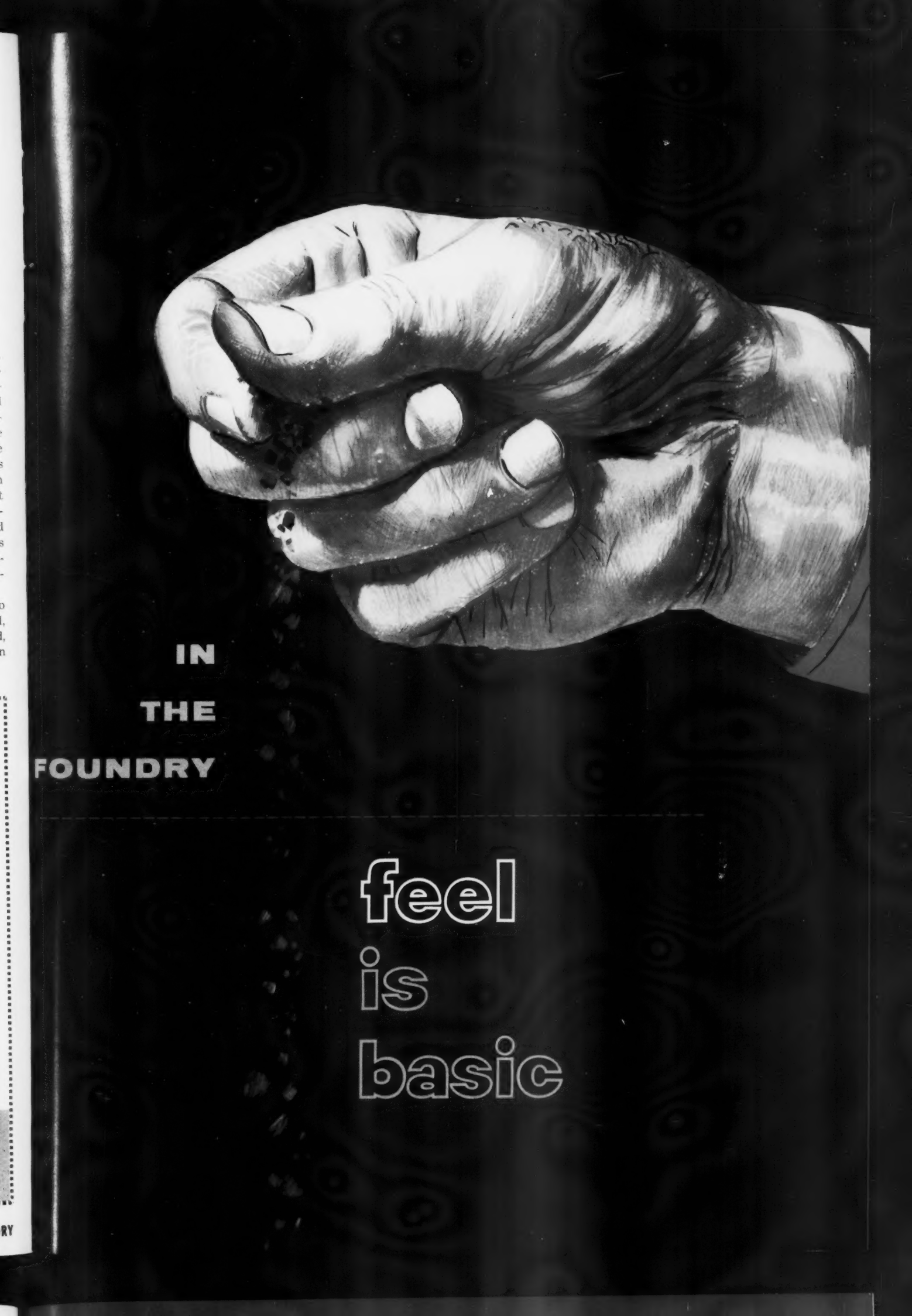
By L. H. BAKER
Mabry Foundry & Machine Co.
Beaumont, Tex.

SIMPLE, economical and practical method for making swept-up cores uses a longitudinal half-section of steel pipe into which holes have been burned, drilled or cut. The pipe section is placed on a board or truck and the core is swept up on the pipe with an ordinary core sweep. Paper may be placed over the perforated pipe to prevent ramming sand through the holes. When the core is dry it will separate freely from the pipe section.

Large, bulky cores made by this method can be dried in 4 to 8 hr less than required for solid cores. There will be no green spots in the center. Less core sand is required, and coremaking time is reduced considerably. When the dried core halves are assembled and placed in the mold, the hollow center may be filled with heap sand to prevent metal from filling the cavity.

The method may be applied to any size core, using various pipe sizes, with good results. When pipe sizes are 25 in. diam or more, 10 to 12 in. sand should be packed around the pipe as shown in the accompanying illustration.

Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $15 for each idea submitted and published. Send a photo or drawing with your idea


IN
THE
FOUNDRY
feel
is
basic

IN THE FOUNDRY...
FEEL IS BASIC

The pressure is on. New techniques, new fully automatic equipment and tougher competition are causing rapid and drastic changes in the industry. But success or failure still is determined by one basic ability. It has many names. We call it **"feel".**

Whether it's the actual feel of a perfect sand mix or the creative "feel" of the design engineer, this ability is the essential element in every foundry operation. Some have more of it than others. They become the leaders.

That's why SPO has become the world's largest supplier of molding machines. Its design, engineering, production and management teams have a highly developed sense of "feel" . . . the ability to anticipate, develop and produce superior equipment to meet the industry's changing needs.

WORLD'S LARGEST SUPPLIERS
SPO
OF MOLDING MACHINES

THERE'S A SPO MACHINE FOR EVERY MOLDING JOB

Whether you count your molds in tens or in thousands . . . make a variety of castings or concentrate on a few . . . SPO has a molding machine to meet your requirements. Engineered to produce uniform standard molds, SPO machines are famous for their speed, accuracy, dependability and low-cost operation.

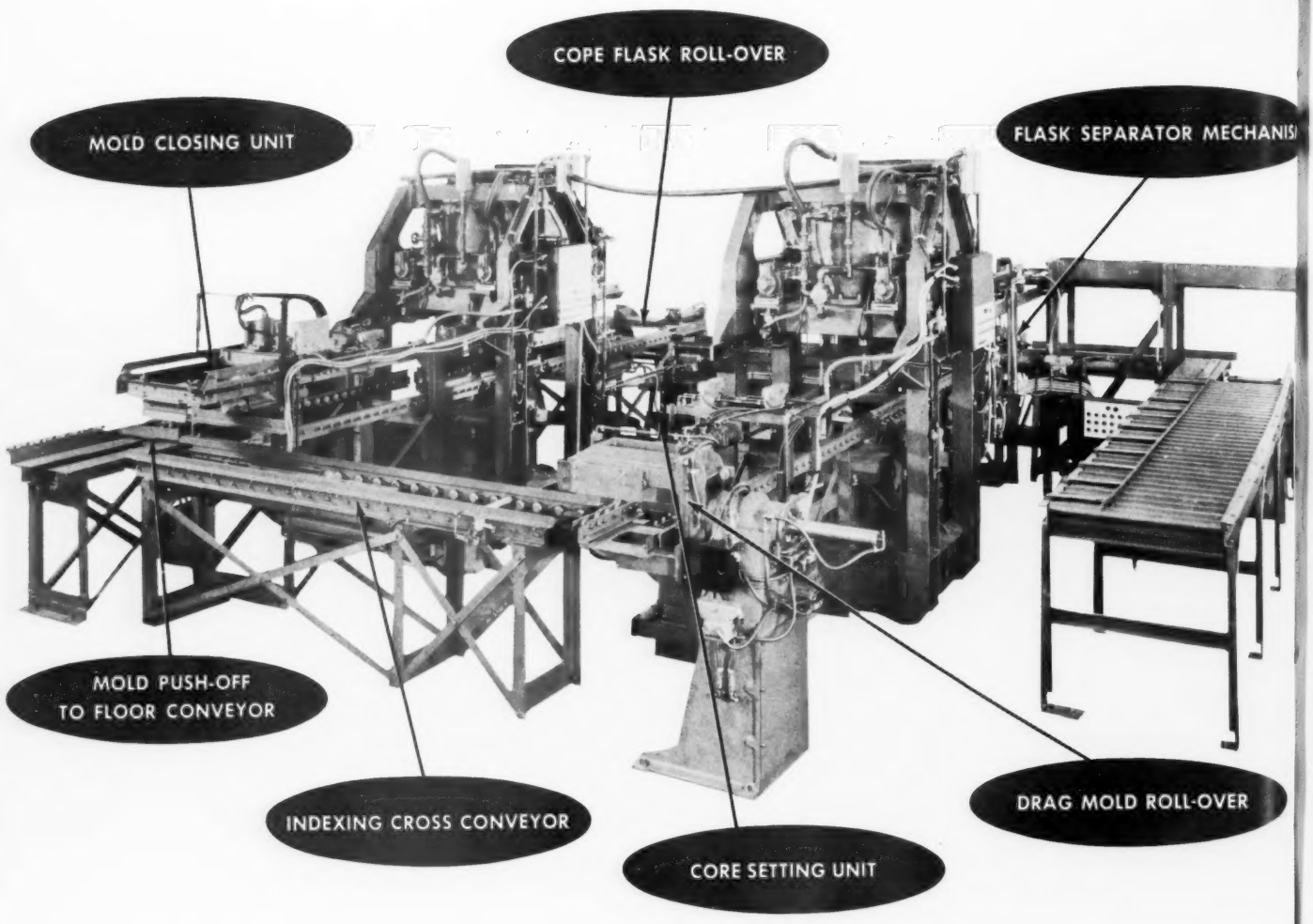
By combining imagination with experience, SPO engineers developed the first practical fully-automatic molding machine. This outstanding unit . . . the SPOMATIC . . . revolutionized mass production molding. It was the answer to . . .

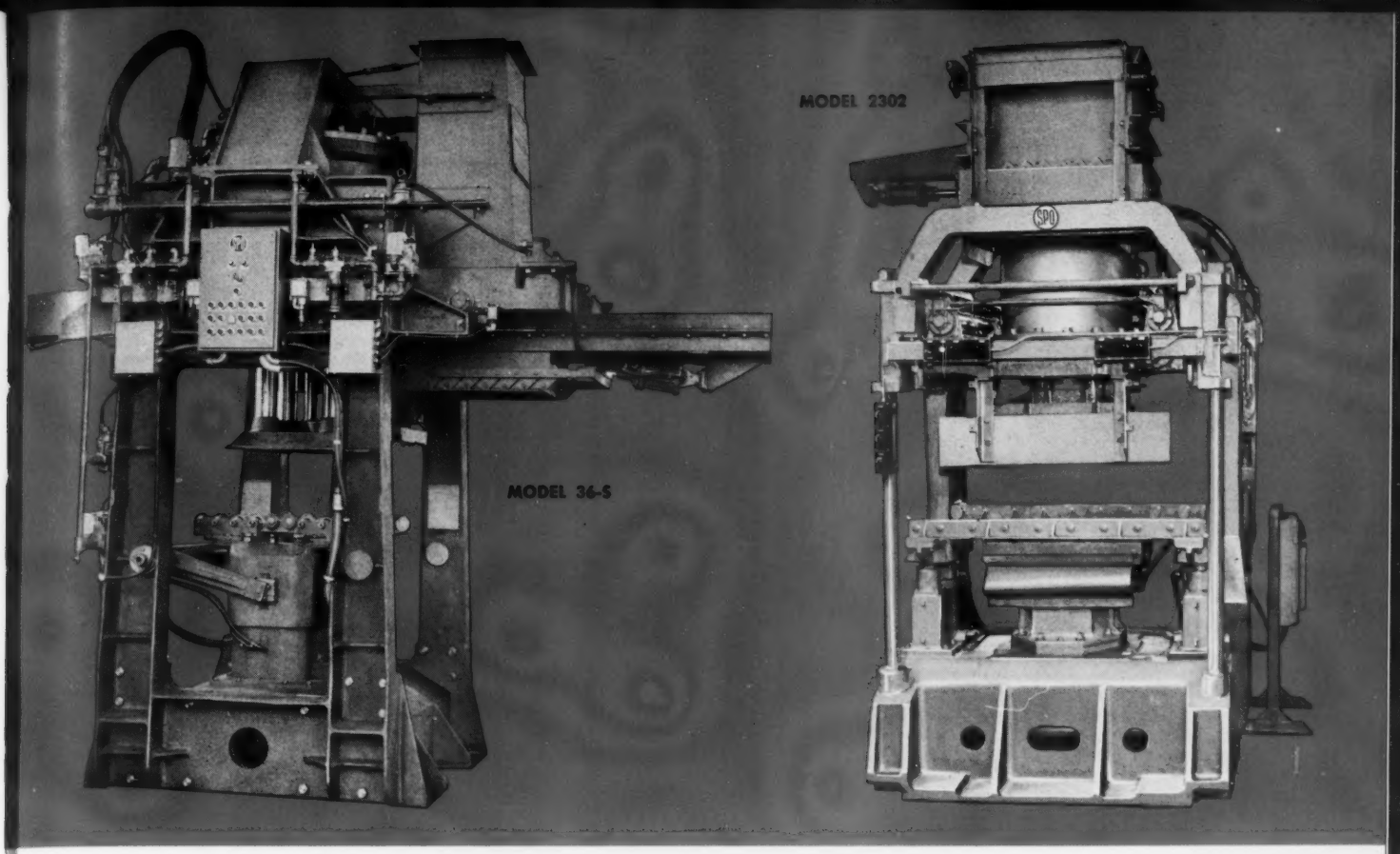
. . . AUTOMATION

for the CHANGING foundry

Faced with steadily rising costs and greater competition from weldments and die-castings, high production foundries are turning to integrated fully-automatic equipment. These foundries are converting existing plants . . . or creating new facilities . . . to take full advantage of the tremendous economies and increased capacity that automation can give them. And the SPOMATIC is the heart of these modern foundries. Once a SPOMATIC is started, all operations are fully automatic, mechanical and continuous.

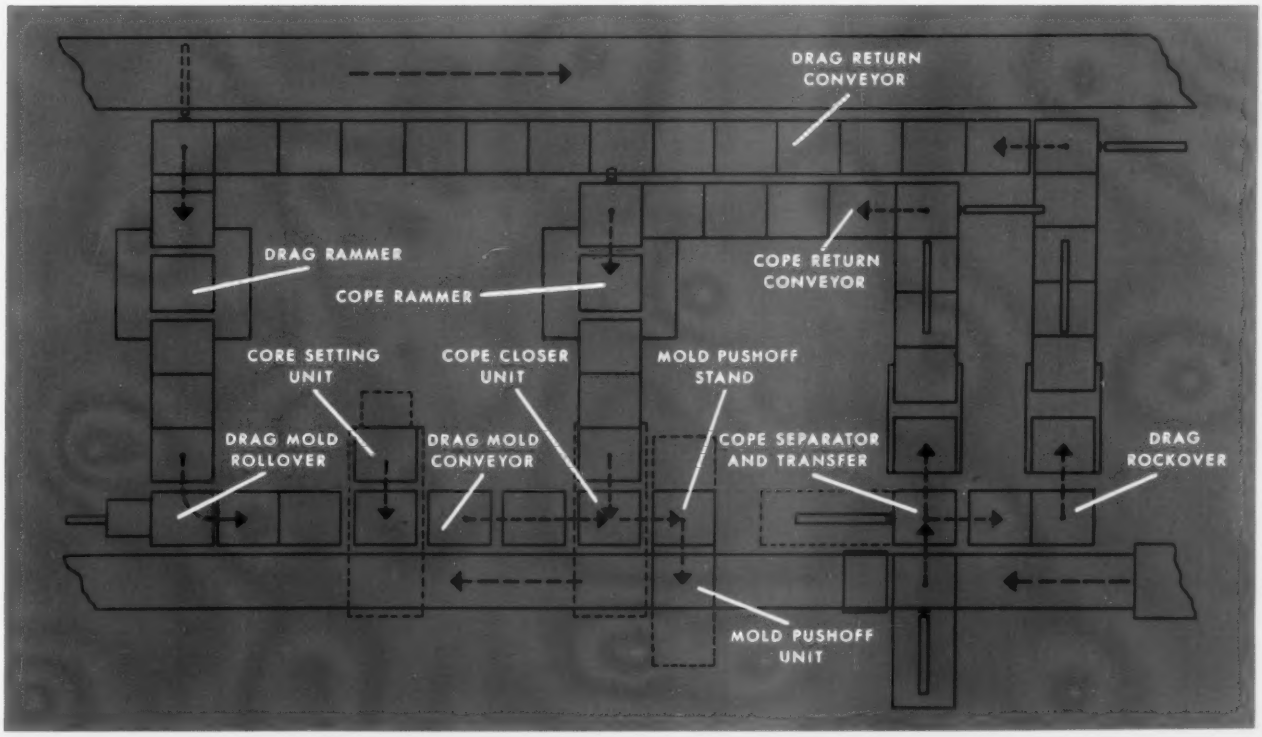
SPO is the recognized leader in the development and production of fully-automatic molding machines. A steadily growing backlog for SPOMATIC units is an eloquent testimonial to this leadership.



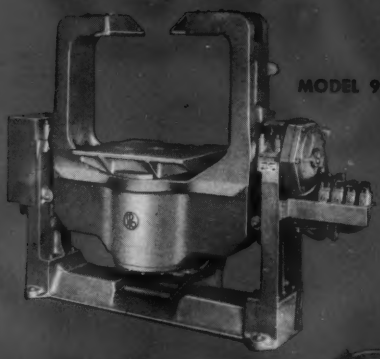


For foundries whose current facilities or needs do not permit full automation, SPO now offers a line of smaller semi-automatic ramming units and SPOMATIC-type auxiliary equipment that provide many of the advantages of high-speed molding. These units can be supplied in a variety of sizes and capacities. They permit varying degrees of automatic operation to meet present requirements . . . and are the nucleus for later conversion to fully-automatic equipment.

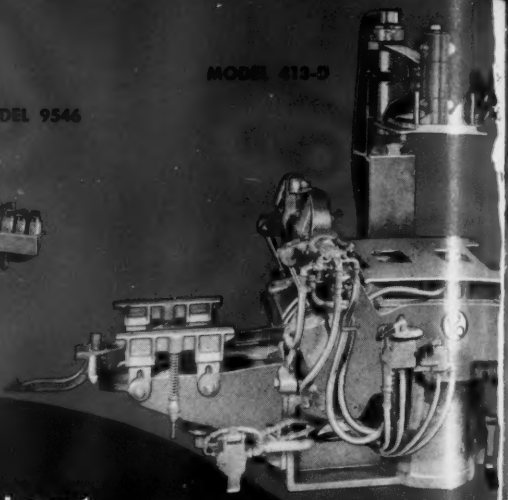
TYPICAL SPOMATIC LAYOUT FOR FULLY AUTOMATIC PRODUCTION



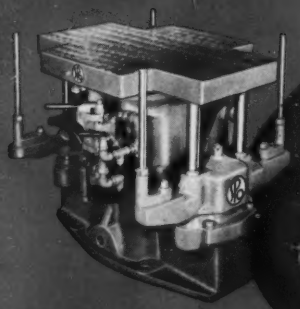
MODEL 110-J



MODEL 9546



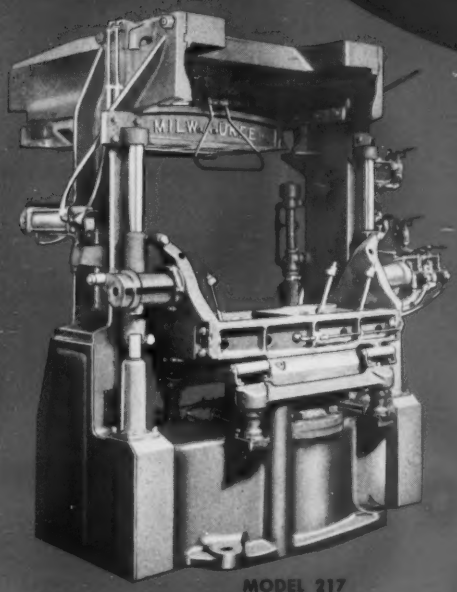
MODEL 413-D



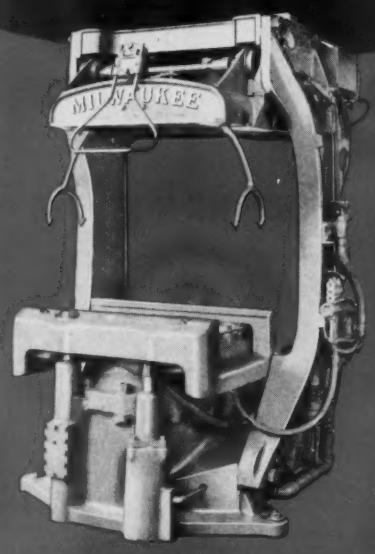
MODEL 3070

From the smallest to the largest . . .

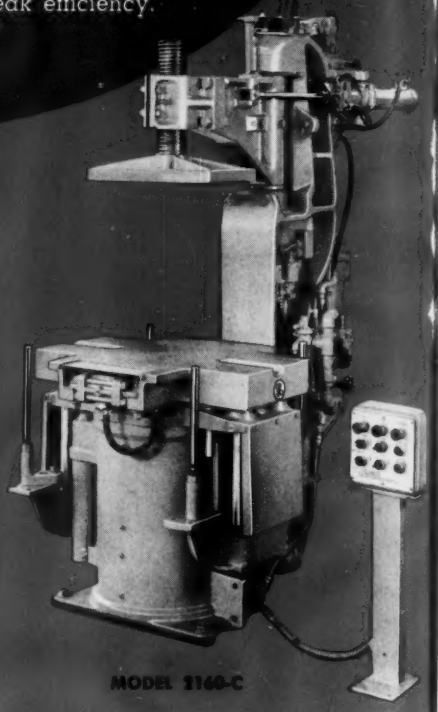
SPO's complete line ranges from small manually-operated units to semi-automatic pushbutton giants. Most feature the patented SPO "inverted jolt" mechanism as well as other exclusive cost and time-saving features. These versatile machines are designed for foundries **modernizing** their existing facilities. Shipped complete with necessary valves, controls and lubrication fittings, they require only attachment of an air line for long operation at peak efficiency.



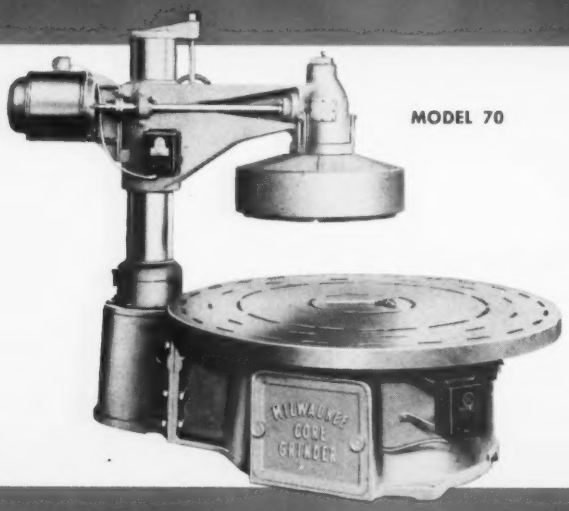
MODEL 217



MODEL 214

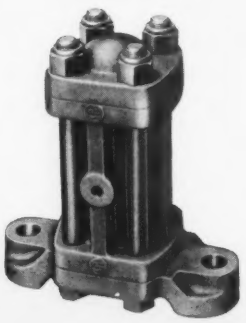


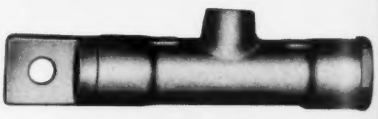
MODEL 2160-C



MODEL 70

SERIES 81





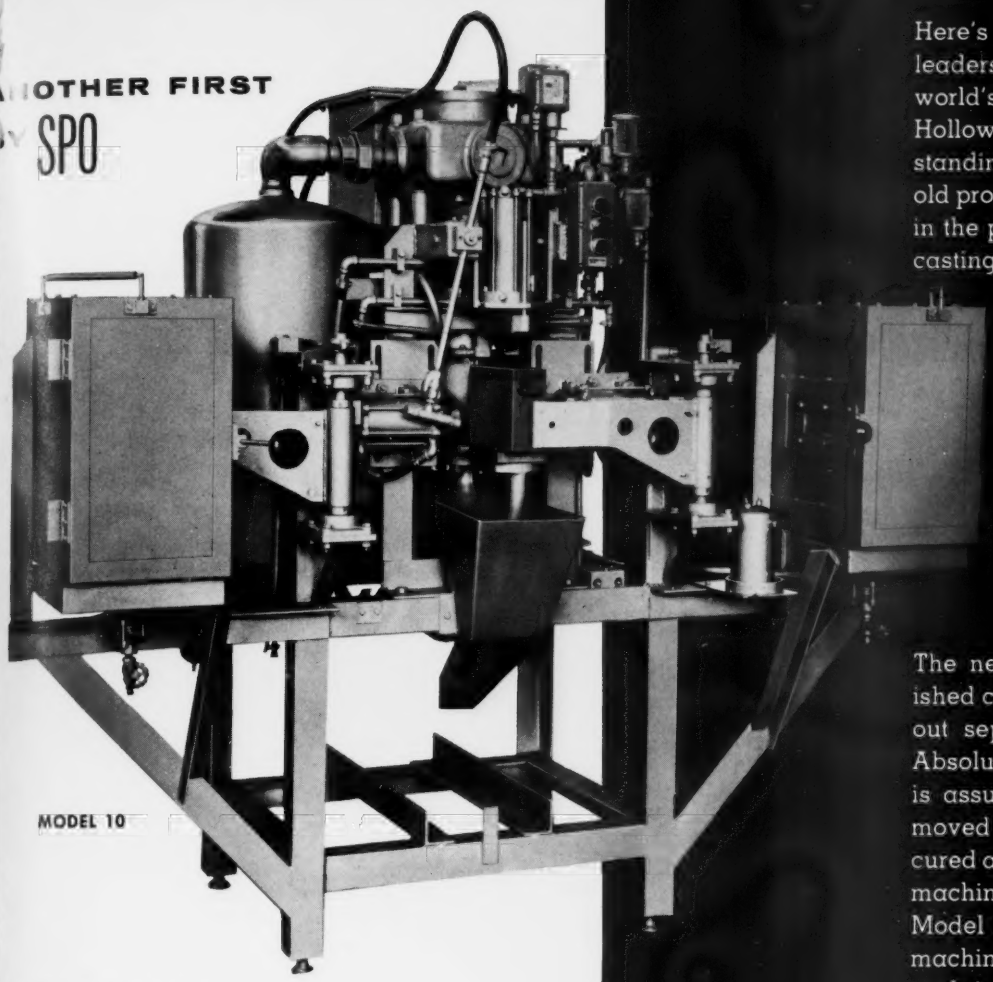
SERIES 76

SERIES 78

CORE GRINDERS SPO-MILWAUKEE core grinders . . . available in both stationary and portable models . . . will handle practically all types of intricate and cumbersome cores.

VIBRATORS SPO also produces a complete line of powerful dependable air vibrators featuring full-power starting, high-speed operation, low air consumption and long service life.

ANOTHER FIRST BY SPO

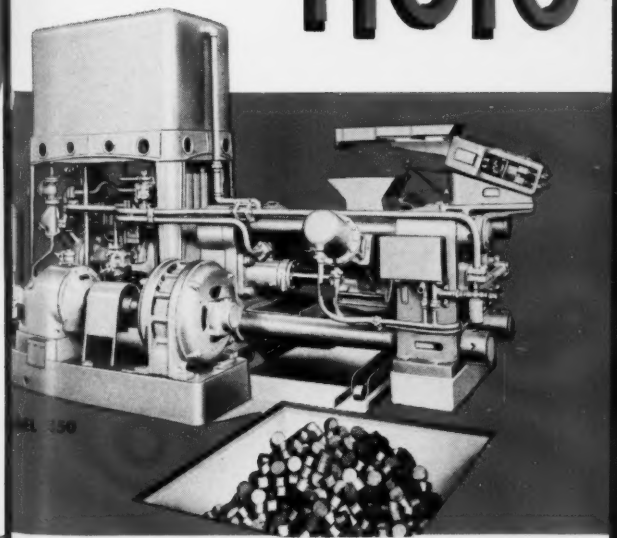


MODEL 10

Here's another example of SPO's leadership in the foundry . . . the world's first **hollow core** machine. Hollow cores provide unique and outstanding advantages . . . solve age-old problems of venting and accuracy in the production of uniform standard castings.

The new SPO Model 10 makes finished cores in a 45-second cycle without separate dryers or core ovens. Absolute accuracy of finished cores is assured because they are not removed from corebox or handled until cured and ready for use. A two-station machine requiring only one operator, Model 10 can be installed in molding machine lines to speed up production . . . bring new precision and economy to molding operations.

THE NEW SPO holo-core MACHINE



BRIQUETTING PRESSES Six models with capacities ranging to 3½ tons per hour are available to convert bulk machine scrap into dense cylindrical briquettes that classify as high-grade scrap . . . solve storage and handling problems.

HOLLOW CORES
eliminate venting problems

HOLLOW CORES
permit faster easier shake-out

HOLLOW CORES
assure closer tolerances

SPO

FULLY INTEGRATED FACILITIES . . . ranging from basic design and engineering services to modern production equipment . . . permit SPO to deliver machines that are long on economy and dependability . . . low on maintenance and replacement . . . tops for quality. That's why SPO is the

WORLD'S LARGEST SUPPLIER OF MOLDING MACHINES

Three plants and teams of highly skilled people are ready to supply your individual needs. Whether you are interested in **automation** or **modernization**, SPO has the machines you need to do a better job faster and more economically.

SPO INCORPORATED 7100 GRAND DIVISION AVENUE • CLEVELAND 25, OHIO
TELEPHONE – DIAMOND 1-3666

6253-SI

LITHO. IN U. S. A.

engineer needs foundry help, and the foundryman needs the design engineer's help to broaden the market for castings. Most design engineers do not know enough about casting procedure to design for economical production that will be competitive with other forms of fabrication. At the design stage in industrial construction, important decisions are made on materials used. Selection of the manufacturing method of the material often proves hardest due to the many factors that must be considered in determining the one that will be satisfactory and economical. While the design engineer will do the best with what he has in the way of knowledge and previous experience, he must depend on published literature supplied by the producers of components.

Bernard M. Ames, vice president, Columbian Bronze Corp., Freeport, L. I., N. Y., speaking on "Factors in the Shell Mold Market," indicated that developments of suitable applications for shell molded castings should be made at the engineering level. While the ultimate end cost of the piece may be high, this price can be justified if machining costs are reduced or eliminated.

Figure Costs Accurately

In selling the product, consideration must be given to possible redesigning of the part to permit shell molding. Accurate cost data are necessary. Mr. Ames warned against overselling. Application of the process to the particular casting must be sound if the operation is to be successful. Mr. Ames suggested a mounted machined casting as a pattern for making sample castings and studying gating before the production pattern is made. Cost of the pattern should be borne by the customer.

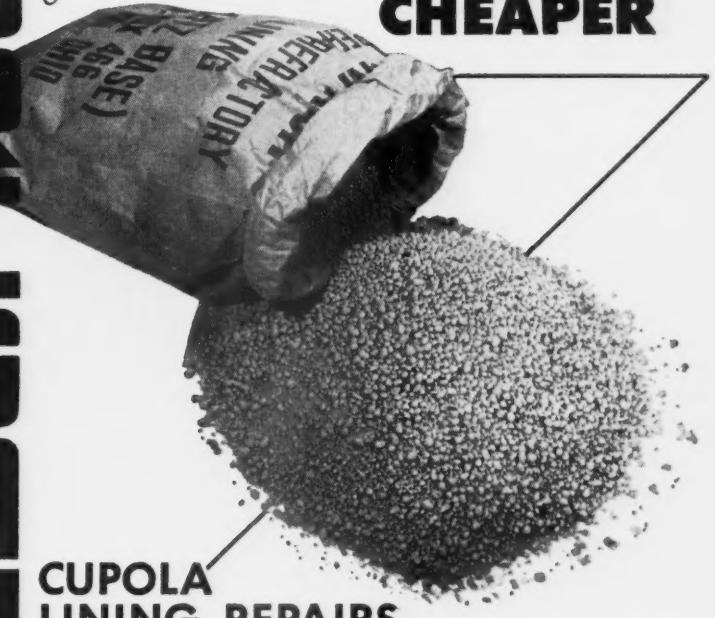
Awards of the first product development contest of the society were made at the Tuesday luncheon by the past chairman of the Product Development Committee, Ross L. Gilmore. The contest had as its objective the development of designs to improve the over-all product, reduce costs, improve casting quality, and bring the many advantages of steel castings to the attention of design and product engineers. All these aims fit into the pattern established by the society of working for the improvement of steel castings produced by member firms through strong research and development programs.

Awards have been made in two categories—Class I, member foundries of the society; and Class II, steel castings users.

Winners in Class I include: 1st prize—$1000: "Now It Can Be Cast," Sands G. Falk and David P. Miller, Falk Corp., Milwaukee. 2nd prize—$500: "A Method of Product Development," Robert J. Franck, Superior Steel & Malleable Castings Co., Benton Harbor, Mich. 3rd prize—$250 (tie): "Cast-Weld Shakeout Unit," Vernon Lich, General Steel Castings Corp., Granite City, Ill. 3rd prize—$250 (tie): "Cast Louver Grill Door Replaces Fabricated Louver Grill Door for M-48 Tank," Roy W. Daub (for the engineering staff) Lebanon Steel Foundry, Lebanon, Pa.

Winners in Class II include: 1st prize—$1000: "Contour Chill Castings Are Foolproof Tools for Industry," R. E. Groethe, Corning Glass Works, Corning, N. Y. 2nd prize—$500: "Cast Steel Weldments Form Centrifugal Pump Barrel," Charles L. Babb, Allis-Chalmers Mfg. Co., Milwaukee. 3rd prize—$250; "Forged to Cast Steel Hooks," R. P. Fox, Clyde Iron Works, Duluth, Minn. The

DUREGAN for BETTER—FASTER—CHEAPER



CUPOLA LINING REPAIRS

DUREGAN, when applied pneumatically with air guns to the melting zone of the cupola, enables the replacement of the burned out lining to be made in the shortest possible time with a minimum amount of drop-off.

DUREGAN is a silicious mixture prepared from carefully selected and washed Quartz pebbles and sands thoroughly coated with high quality Plastic Fire Clay and other bonding agents. The thoroughly coated Silica grain induces the cementing action which firmly holds the Quartz pebbles into place with minimum rebound. Operating cupola temperatures develop the necessary ceramic bond that welds this applied mass into a strong, dense lining.

DUREGAN is screened to meet the requirements of all standard equipment now employed for this type of cupola lining. Shipments are made either in multiwall bags or in bulk, as the customer specifies.

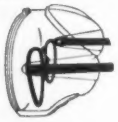
DUREX
REFRACTORIES CO.
JACKSON, OHIO

Even workers wearing glasses say they "never had it so COMFORTABLE!"

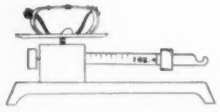
High flexibility
Pliable frame permits wearing for hours in comfort.

Easy-to-change lens
Replaceable lenses cut cost—no need to replace entire goggle. Lens held firmly in molded groove.

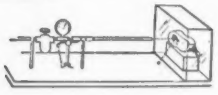
Wearing comfort
Channeled sides of frame give comfortable clearance over spectacle temples.



Light in weight
Can be worn all day without fatigue—encourage continuous protection.



Impact resistance
Pass recognized tests for impact protection as listed in Federal Specification GGG-G-531a, Goggles and Spectacles, all plastic, industrial.



Workers who wear prescription glasses—even big plastic frames—are mighty glad to get the extra roominess provided by NO. 90A MONOGOGGLES. Its greater clearance results in utmost comfort.

Exclusive Willson features described at left encourage workers to wear these sturdy MonoGoggles. Note how large flat .060 plastic lens provides "picture-window" scope of vision—how the deep, transparent light green frame admits side vision while eliminating glare.

Ask your Willson distributor to demonstrate its unique protection against light impact hazards like those found in spot welding, buffing, woodworking and chemical handling. You have a choice of ventilated or non-ventilated frames, clear or green plastic lenses. Bulletin mailed promptly on request.

Every exclusive feature in NO. 90A MONOGOGGLES® adds up to Lightweight Comfort — Extra Convenience — Superior Impact Resistance!

improved style by

More than 300 Safety Products Carry This Famous Trademark

WILLSON®

Leaders in Research and Development of Safety Equipment Since 1870

237 WASHINGTON ST., READING, PA.

National honorable mention contest awards were made to the following in Class I: M. R. Atwater, Kay Brunner Steel Products Inc., Alhambra, Calif.; N. B. Akitt, Adirondack Foundries & Steel Inc., Watervliet, N. Y.; R. N. Dobson, Dominion Foundries & Steel Ltd., Hamilton, Ont.; R. S. Nobles, Mountain State Steel Foundries Inc., Parkersburg, W. Va.; L. S. Krueger, Pelton Steel Casting Co., Milwaukee.

National honorable mention awards in Class II: W. W. Young, D. J. Sparr, E. F. Buchanan, F. K. Rader, Flxible Co., Loudenville, O.; T. R. Linskey, O. L. Borgerson, Fisher Governor Co., Marshalltown, Iowa; A. P. Boh, Boh Bros. Construction Co., New Orleans, La.; C. B. Neff, Wabash Drilling Co., St. Louis; W. J. Henry, Yale & Towne Mfg. Co., Philadelphia; R. R. Barber, Parsons Co., Newton, Iowa.

Michigan Regional Conference Is Scheduled for Dec. 1-2

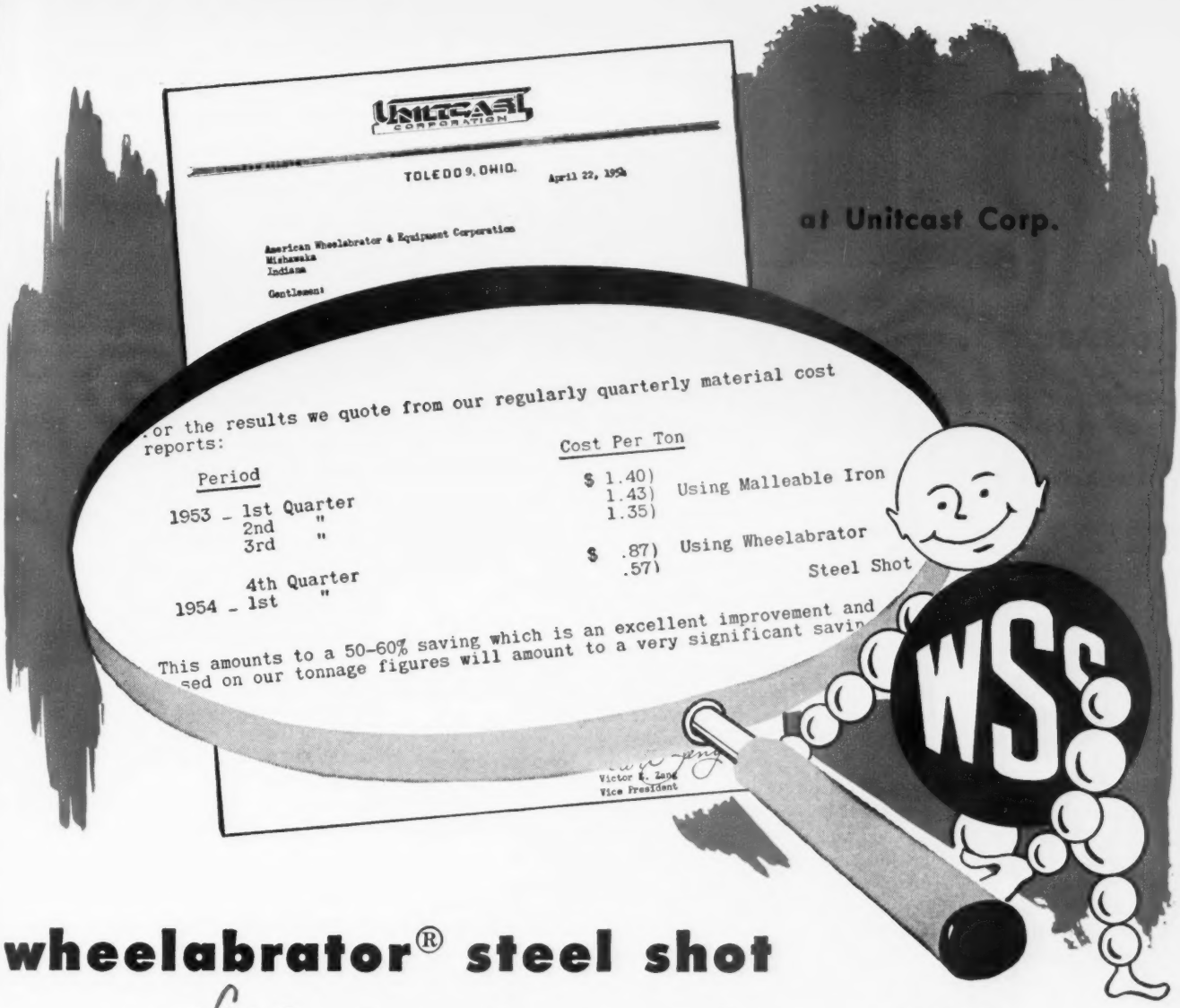
Annual AFS Michigan Regional Conference will be held at Michigan State College, East Lansing, Mich., on Dec. 1-2, 1955. Sponsors of the conference include the following AFS chapters: Detroit, Saginaw Valley, Central Michigan, and Western Michigan.

General conference chairman is John Van Haver, Sealed Power Corp., Muskegon, Mich. Other committee chairmen are: Program, Fred Strieter, Dow Chemical Co., Midland, Mich.; Finance, Vernon Patterson, Climax Molybdenum Co., Detroit; Publicity, Fred De Hudy, Centrifugal Foundry Co., Muskegon, Mich.; Student Activity, Robert Dodge, Archer-Daniels-Midland Co., Detroit.

Vernon Patterson is vice chairman of the conference; Prof. C. C. Sigerfoos, Michigan State College, secretary; Doarde Triponi, Michigan State College, treasurer, and Jess Toth, Harry W. Dietert Co., Detroit, permanent executive secretary-treasurer.

Guide to Specifications Is Offered by Government

Purchasing specifications used by military and civilian agencies of the federal government are discussed in "U. S. Government Specifications Directory." Information on reference sources of the specifications and standards is contained in the guide which is for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25. The price is 25 cents.



wheelabrator® steel shot *magnifies* abrasive savings 60%

Every ton of castings cleaned at Unitcast Corp. magnifies the savings this Toledo firm has made by switching from a malleableized abrasive to Wheelabrator Steel Shot.

Abrasive costs per ton of material cleaned have dropped from $1.43 to 57c — a saving of 86c a ton by using Wheelabrator Steel Shot. This saving grows to $86 for every 100 tons cleaned. It means $1 spent for Wheelabrator Steel Shot buys as much cleaning as $2.50 spent for malleable iron abrasive.

The hardness of Wheelabrator Steel Shot (42 to 50 Rockwell C), its toughness, native impact strength, and rebound properties guarantee you more for your abrasive dollar when you use this superior electric furnace steel shot. Why not try it yourself? For complete details, write for Bulletin 89-B.

American WHEELABRATOR® *trail blazer of industrial progress*

AMERICAN WHEELABRATOR & EQUIPMENT CORP., 505 S. Byrkit St., Mishawaka, Indiana

Man to Man

By RALPH L. LEE

Professional Leaders

"Handing out promotions to supervisory posts for anything else but leadership ability is clearly out of order in this new day and age"

I WILL have to admit (with some shame) to a certain amount of hidden glee as I see a distinguished department head of a great big foundry grab a shovel and try to help me in the Lee Hobby Foundry. Usually, either it's been so long since he had a shovel in his hand that he's all out of practice, or he never learned to use one in the first place. Isn't it amazing how revealing the grabbing of a molder's shovel can be?

Time and again I've had seasoned and successful foundry specialists tell me about the kick they get in our foundry out of seeing every function from sand conditioning through melting and molding to shakeout and snagging carried on within arms' reach, so to speak.

Most of these folks have been holed up for years in one department of a big operation. They are so thoroughly swamped with their own specialized responsibilities that they rarely, if ever, get a chance to wander around through the plant to see what the other fellow is up to. And even if they did get the chance, I imagine they would find the operations being carried on so far apart that it would be almost impossible to see everything going on simultaneously.

Any number of these folks tell me how much they'd like to spend several days with me getting their hands in the sand to carry some job clear through from start to finish. I tell 'em they're perfectly welcome to come any time, and that it might be a darned good thing: The over-all, firsthand experience might pay off some way or other in the performance of their jobs as specialists. So far none of them has taken me up on this invitation. After all, specialization is the order of the day, not only in big foundries, but in the smaller ones, and more and more as time goes on.

With foundries being laid out on the basis of time and motion studies and each operation being broken down into smaller and smaller pieces to be specialized on by individuals, there is little wonder that the supervision of these specialists frequently is carried on by folks who practically have made a career of that particular specialty without ever having served an apprenticeship at the noble old trade of molding.

Then if we'll look upon supervision as a specialty, aside from the nature of the work involved, we'll see (at least I do) managers and bosses of one kind or another who have won their spurs in work far afield from the foundry business moving into the foundry and in a surprisingly short time getting the hang of things. I don't know when I've heard a foundry boss say, as bosses used to, "I never ask anyone to do anything I can't do."

In fact, today, unless I'm badly mistaken, it's a darned sight easier to supplement an accomplished supervisor or leader with the technical information or help he needs to run a department than it is to supplement a super-duper technician with the supervisory know-how required. Maybe it's something on the border of an industrial physician who can move from a pottery to a foundry without missing too many strokes, the innards of potters and molders being about the same.

In any event, it seems to me, that the time has come or is getting near when we've got to recognize the difference between MECHANICS and HUMANICS in the supervision of an organized group. I'm willing to stick my neck out, from what I've seen, to say that supervisors outstandingly qualified in both the mechanics and the humanics of a job are almost nonexistent.

Usually the natural inclinations which lead to outstanding accomplishment in the field of mechanics are at the opposite end of the spectrum from the inclinations which lead to success in group leadership. We don't have to look very far or for long to discover that the one instinctively plays solo and the other is inclined to play his piece anonymously through others with a silent baton. Exceptions to this rule clutter up this picture, but in the main I have found it to be accurate for all practical purposes.

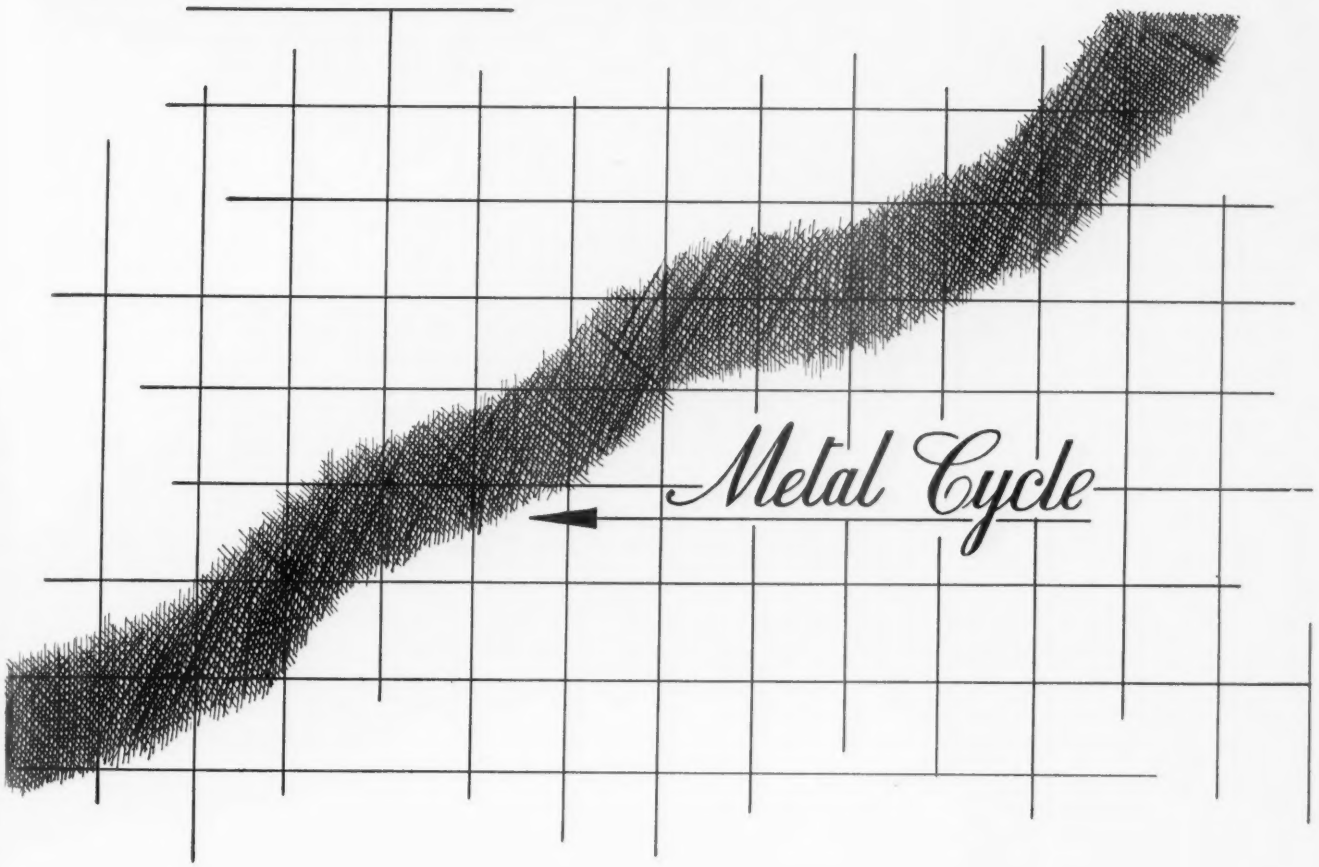
If we are on the right track, it seems to me that the far from exceptional practice of handing out promotions to supervisory posts as "Oscars" for mechanical ingenuity, process or product development, seniority or anything else but leadership ability is clearly out of order, particularly in this new day and age.

There are times, of course, during the infancy, adolescence and maturity of an organization when for a time humanics must step aside for other, crucial considerations. But for the long haul, directing the efforts of others, untangling person-to-person mixups, fitting square pegs into square holes, helping the individual to make the most of what he's got and co-ordinating the efforts of the group must be a profession in every sense of the word requiring well trained and seasoned specialists.

Collecting leaders has been a hobby of mine for most of my life. After examining my specimens I find certain personal traits in common to most of them, traits which I believe can be recognized in those we are considering for promotion into supervisory positions. It struck me that a list of these traits might fit into this brainstorm at this point:

1. Has low voice, frequently slow and thoughtful speech.
2. Appearance is neat, in moderate style.
3. Rarely hurries.
4. Has easy gait, moderate pace.
5. Does not show all he feels and thinks.
6. Looks a person squarely in the eye, without staring.
7. Is punctual.
8. Is orderly.
9. Is accurate.
10. Is decent.
11. Laughs only when he means it.

Metals for Metal Conditioning



More than 75% of all known elements are metals.

Progress in alloying, fabricating, processing and treating has made the applications of metals continue a rapid, ascending cycle, as exhibited above in graphic form.

Metals as processing factors for peening, cleaning and conditioning of metal parts have kept abreast with the general metal cycle.

Metal abrasives to meet the most difficult, as well as the most delicate, operations, are engineered and produced by the:

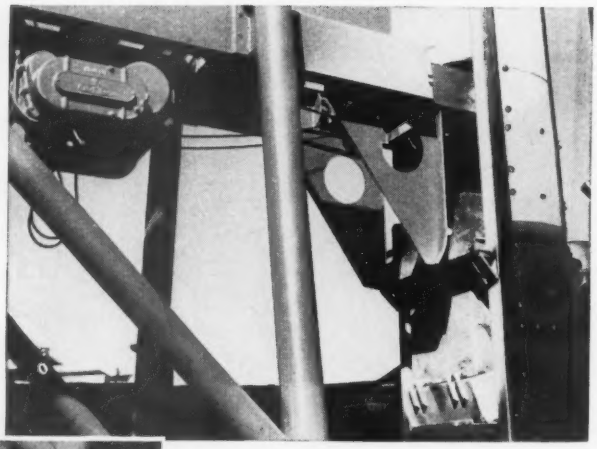
ALLOY METAL ABRASIVE CO.

121 South Division Street, Ann Arbor, Michigan

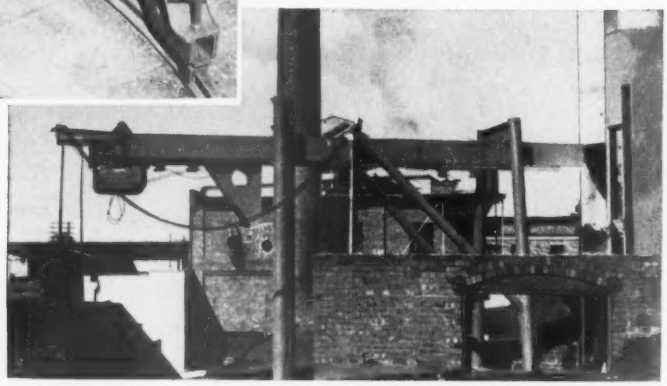
Entirely new method of

CUPOLA CHARGING

loads MORE and FASTER with LESS HELP



Three views of the Columbiana Automatic Cupola Charger: Top shows close-up of machine; left shows its mobile base; bottom shows complete setup.



The Columbiana Automatic Cupola Charger shown is capable of placing 1000-lb. charges every 1½ minutes. The machine is entirely automatic, but its movements may be controlled by an operator. Services of only two men are required for weighing and placing the charge in the charging bucket. A single control button starts the automatic cycle that lifts the load vertically 25 feet, then carries it horizontally into the cupola, where the bucket is lowered and discharged, after which it returns automatically. This machine is entirely new, but the manufacturers have several sizes available. Call or write:

MACHINE DIVISION

OF

THE COLUMBIANA PUMP CO., COLUMBIANA, OHIO

12. Rarely interrupts.
13. Rarely if ever loses his temper.
14. Does not like to argue.
15. Seldom says "I".
16. Is not afraid to have others think he doesn't know when he doesn't.
17. Rarely tells everything he knows.
18. Makes sure everyone knows the difference between his opinions and facts.
19. Is easy to meet and easy to leave.
20. Enjoys a contest of wits.
21. Is a good loser.
22. Is bored by too much logic.
23. Is hard to sweep off his feet.
24. Never takes himself too seriously.
25. Listens well and gets quickly to the point.
26. Likes people (one at a time).
27. Likes his job.
28. Has assurance.
29. Gets around.
30. Has a good memory.

Issues Duct Size Calculator

Duct requirements for dust collection, gas evacuation, product reclaiming and similar problems are determined at a glance by a calculator being distributed by the Ducon Co., Mineola, Long Island, N. Y. The front of the calculator has two sets of sliding scales—one converts gas volume flow and velocity to duct diameter, the other reads friction loss per 100 feet for a given duct size and gas velocity. Two scales on the back convert round duct diameter into equivalent rectangular ducts of all proportions and convert diameter in inches to area in square feet. The calculator is sent to those requesting it on their company letterhead.

Book Review

Symposium on Effect of Temperature on the Brittle Behavior of Metals with Particular Reference to Low Temperatures (ASTM Special Technical Publication No. 158) cloth, 474 pp, 6 x 9-in., published by American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $7.50.

Of particular value to foundries producing castings for refrigerators and equipment operated at low temperatures, this book brings together and summarizes information concerning the joint role played by metallurgical and mechanical factors and their influence on the behavior of metals at low temperatures. The book is well illustrated with charts and pictures of brittle failures and consists of 27 papers plus discussions.

A. P. GREEN 'SAIRSET

AIR-SETTING • HIGH TEMPERATURE BONDING MORTAR

GIVES ADDED LIFE AND PROTECTION TO FIREBRICK JOINTS

'SAIRSET gives you one mortar for all types of service—industrial furnaces, boilers, ladles, flues and stacks, and rotary kilns. Its use is universal. It is recommended for laying high duty or super duty fire-clay brick, high alumina brick, or insulating firebrick. 'SAIRSET welds the brick into a one piece unit at temperatures too high for less refractory mortars—or at temperatures too low for heat-setting mortars to form a good ceramic bond.

Firebrick linings last longer when protected with 'SAIRSET. It insures full gastight joints . . . protects the firebrick lining against destructive spalling and shrinkage . . . reduces joint erosion due to chemical attack of slags or dust laden fumes . . . prevents penetration of joints by molten metal or fluid slag.

DOES NOT STIFFEN IN THE DRUM

The plastic consistency of 'SAIRSET makes it easy to remove from the drum. No time is lost and no mixing due to stiffening is necessary. Permits long storage and affords extra savings through the purchase of large quantities.

NO SETTLING

'SAIRSET does not settle out of suspension in the mortar box. Constant agitation is unnecessary to maintain the proper consistency.

EASY TO USE

'SAIRSET comes on the job ready mixed to troweling consistency—with all of its plasticity and other properties fully developed to bring you maximum efficiency and make using easier.

PACKAGED IN READY MIXED PLASTIC FORM

No long soaking period is required to develop the plasticity and smooth workability of 'SAIRSET. Special equipment is used to thoroughly mix 'SAIRSET before it is packaged in airtight containers. Available in 200 and 500 pound metal drums and 5, 15, 50 and 100 pound metal pails.

Your local A. P. Green distributor carries 'SAIRSET and other refractory products in stock. You'll find him listed in the yellow pages of your telephone directory, or write

A. P. Green REFRACTORY PRODUCTS

SERVE THE WORLD'S INDUSTRY

A. P. GREEN FIRE BRICK COMPANY
Mexico, Missouri, U. S. A.
PLANTS: Mexico, Mo. • Woodbridge, N. J. • Sulphur Springs, Texas
In Canada: **A. P. GREEN FIRE BRICK COMPANY, LTD.**
Toronto 15, Ontario

DISTRIBUTORS IN THE PRINCIPAL CITIES OF THE WORLD

View of many of the sales executives and salesmen who attended the sixth annual market development conference of the Malleable Founders' Society, held in Chicago

Pearlitic Malleable and Conversions

Feature Malleable Founders' Conference Discussion

By JACK C. MISKE
Assistant Editor

EXPANDING the market for malleable iron castings—that was the goal of almost 100 sales executives and salesmen of the malleable foundry industry at the sixth annual Malleable Founders' Society Market Development Conference, held Apr. 7-8 at the Edgewater Beach Hotel, Chicago.

Pearlitic malleable applications, conversions, casting defects and effective sales techniques were among the subjects discussed by speakers and members of the audience during the two-day meeting.

The conference was opened by T. A. Scanlan, director of sales, Eastern Malleable Iron Co., Newburgh, N. Y., who substituted for George T. Boli, president, Northern Malleable Iron Co., St. Paul. Mr. Boli, president of the society during 1954, was ill.

Chairman Scanlan introduced Charles E. Brust, president, Malleable Founders' Society, and president, Eastern Malleable Iron Co., who welcomed the group and outlined the aims of the meeting. He emphasized that the malleable industry has problems which require sales know-how and its application. The industry has not kept pace with the over-all growth of American industry and population. It has lost some of its old markets and has not participated extensively in such new ones as electronics, chemicals and road building.

Nonetheless, Mr. Brust said, malleable founders have a good, versatile metal, as well as a good companion to standard malleable in pearlitic, for applications where wear resistance and hardness are required. Pearlitic should be used to the utmost where it will do the job to get back markets from forgings, stampings, weldments and other forms of fabrication; however, it should not be applied where standard malleable is fully suited.

Engineers need to be made aware of the qualities of malleable, and those who specify it should be made satisfied customers. Sales planning should be scientific, based on market research and planned, efficient production. The role of sales is vital.

C. S. Anderson, president, Belle City Malleable Iron Co., Racine, Wis., discussed "The State of Our Market." He noted that the industry has a reputation for being a feast or famine field, partially because the market shifts over the years, causing cycles. Nevertheless, he said, although 66 malleable foundries failed from 1924 to 1941, only 16 failed from 1941 to 1955.

Mr. Anderson saw an increase in tonnage in 1955 to as much as 950,000 tons, compared with 822,000 in 1954. He cited pearlitic as one hope for larger markets and noted that its production tripled from 1945 to 1954, when it accounted for 10 per cent of the total tonnage. Some estimates of its ultimate production run as high as 250,000 tons annually.

Mr. Anderson listed the following points as essential to realization of greater profits: A search for new markets outside the automotive field; a supply of ample funds for research, development and advertising; better selling; precise knowledge of costs; service to customers; and a quality product.

"Pearlitic Malleable for the Small Producer" was the subject of R. V. Osborne, Lakeside Malleable Castings Co., Racine. Pointing out that production of pearlitic has increased at double the rate of increase of standard malleable since 1947, he stated that pearlitic probably will be an important product for all malleable founders, but especially for small ones. One of the biggest problems will be the resistance of engi-

neers and designers who do not know the metal. The remainder of Mr. Osborne's talk covered production methods at his company. Lakeside produces four grades of pearlitic and uses only heat treating, without alloy additions, to make them.

R. H. Marshall, chief materials engineer, Frank G. Hough Co., Libertyville, Ill., addressed the group on "Selection of Materials." After a description of the front-end loaders produced by his company, he explained why weldments often are used in their construction. Cost, fit (e. g., holding 1/32-in. tolerance over 30 to 40 in.), and lack of rigidity are the primary reasons. Regarding cost, weldments represent a compromise between the ductility desired and the higher cost of castings. Fit, permitting vital alignments to be made, is easily achieved with weldments. Finally, weldments, he asserted, lack the rigidity which is undesirable because of the shock impacts the loaders frequently must undergo. Castings offer design advantages, and weldments suffer from notches and residual stress, however.

Next item on the program was the showing of an American Zinc Institute film, "Die Casting," which explained various forms of fabrications and described the advantages of die casting for many applications.

Following the movie, Chairman Tom Scanlan discussed "Nodular Iron Developments." Mr. Scanlan's remarks were confined to a general discussion of the uses of nodular iron, tonnage produced in the metal and its properties.

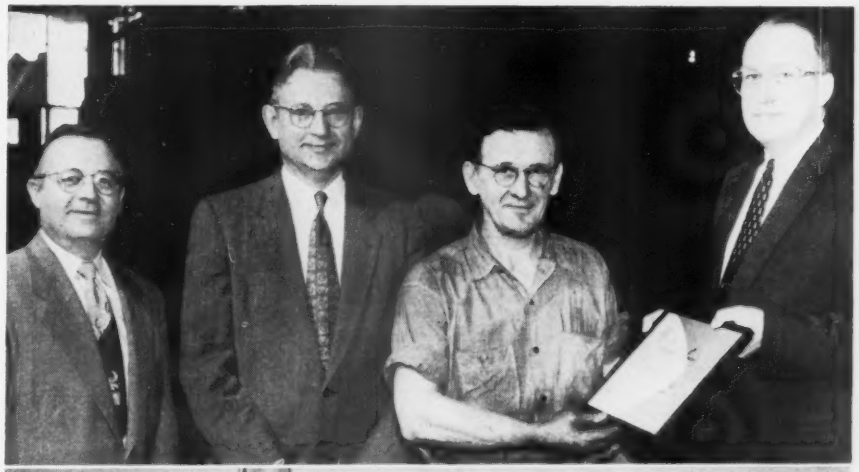
Final event of the first day's session was a series of roundtable discussions on various aspects of "Malleable Sales Appeals—Do We Know How to Use Them Effectively?" The audience divided into eight groups of roughly a dozen each to talk over the following topics, one to each group: Capitalizing on malleable iron's closeness to required form and easy machinability; its corrosion re-

FIVE MALLEABLE FOUNDRIES RECEIVE SAFETY AWARDS

MALLEABLE Founders' Society annually conducts a nationwide self-improvement safety contest and presents awards to the companies showing the greatest improvement over the preceding year. The lost-time accident frequency rate for all participants in 1954 was 15.5 per cent, whereas in 1951, the first year of the competition, the frequency rate was 31.2. Sixty plants took part in the competition and three of the five award winning plants are shown receiving their awards.

Top, left to right, from Chain Belt Co., Milwaukee, Al Bathke, plant safety director, Joe Kropka, plant superintendent, William Wolf, safety committeeman, and L. D. Ryan, managing director, Malleable Founders' Society. Center view, from Milwaukee Malleable & Grey Iron Works, Milwaukee, J. B. Gutenkunst, secretary and treasurer, Vernon Langtean, secretary, safety committee, C. A. Gutenkunst Jr., president, Mr. Ryan, and William Kerner, chairman, safety committee. Bottom view, from Eastern Malleable Iron Co., Wilmington, Del., J. Henry Bruhn, plant superintendent, L. D. Ryan, and Carmen J. Zaccaria, manager, employee relations. Other award winning companies were Oriskany Malleable Iron Co., Oriskany, N. Y., and Terre Haute Malleable & Mfg. Co., Terre Haute, Ind.

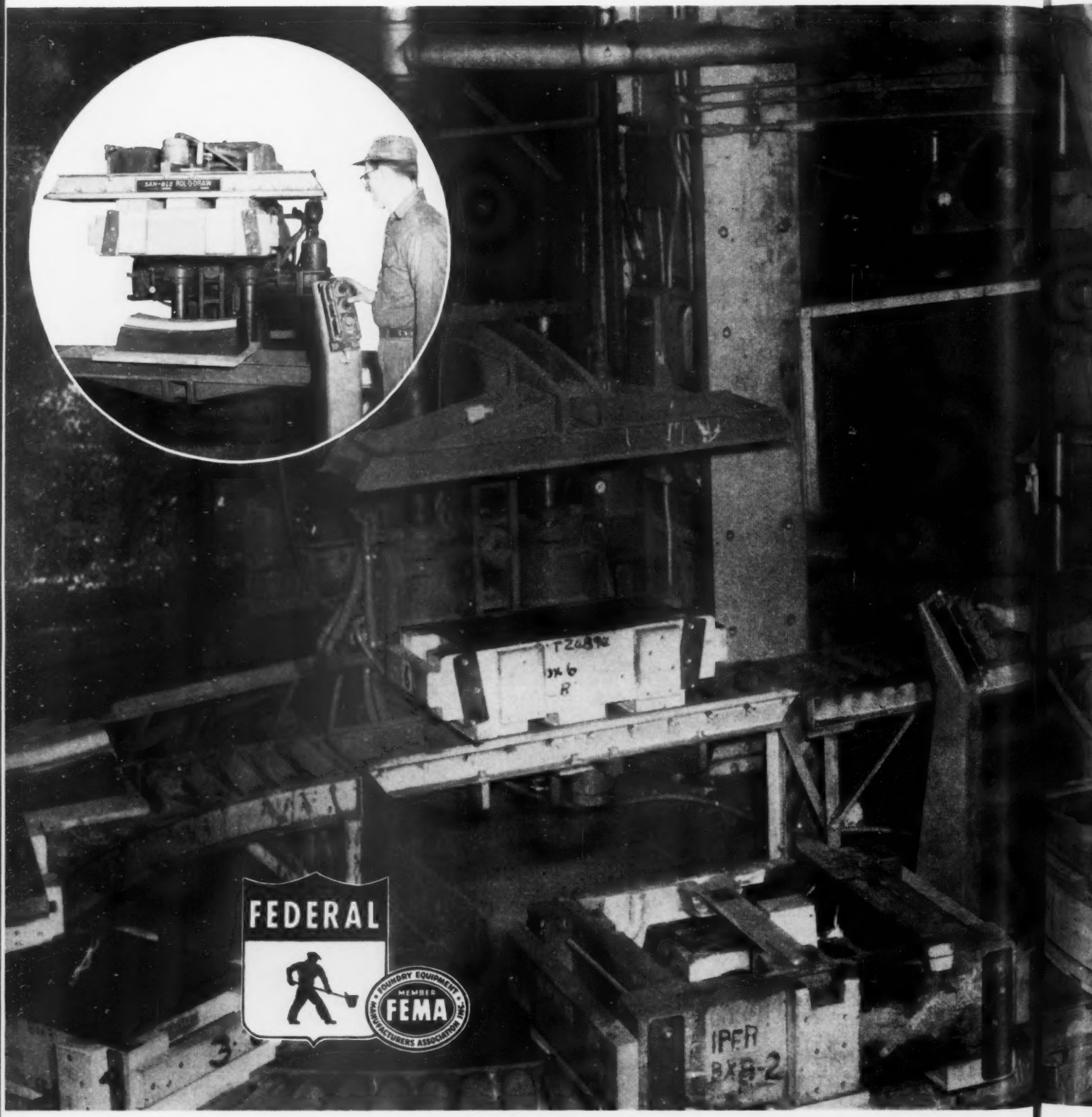
Releasing the statistics, Mr. Ryan indicated four companies had gone through the entire year without a single lost time accident which proves that the industry and its employees benefit enormously from an improvement in its safety record and that those companies that work at the problem can and do get immediate and lasting benefit.



CUTTING COSTS on large cores

Continental Foundry & Machine Company uses a model "250" SAN-BLO Core Blower, SAN-BLO "ROL-O-DRAW" and conveyor loop to form an unbeatable team for reducing costs of making large cores in its steel jobbing foundry. *Twelve different* core boxes are run in *frequently changed sequences* to meet casting requirements, and quickly drawn on the "ROL-O-DRAW", which forms part of the loop.

The SAN-BLO's universal blow plate makes this unusual

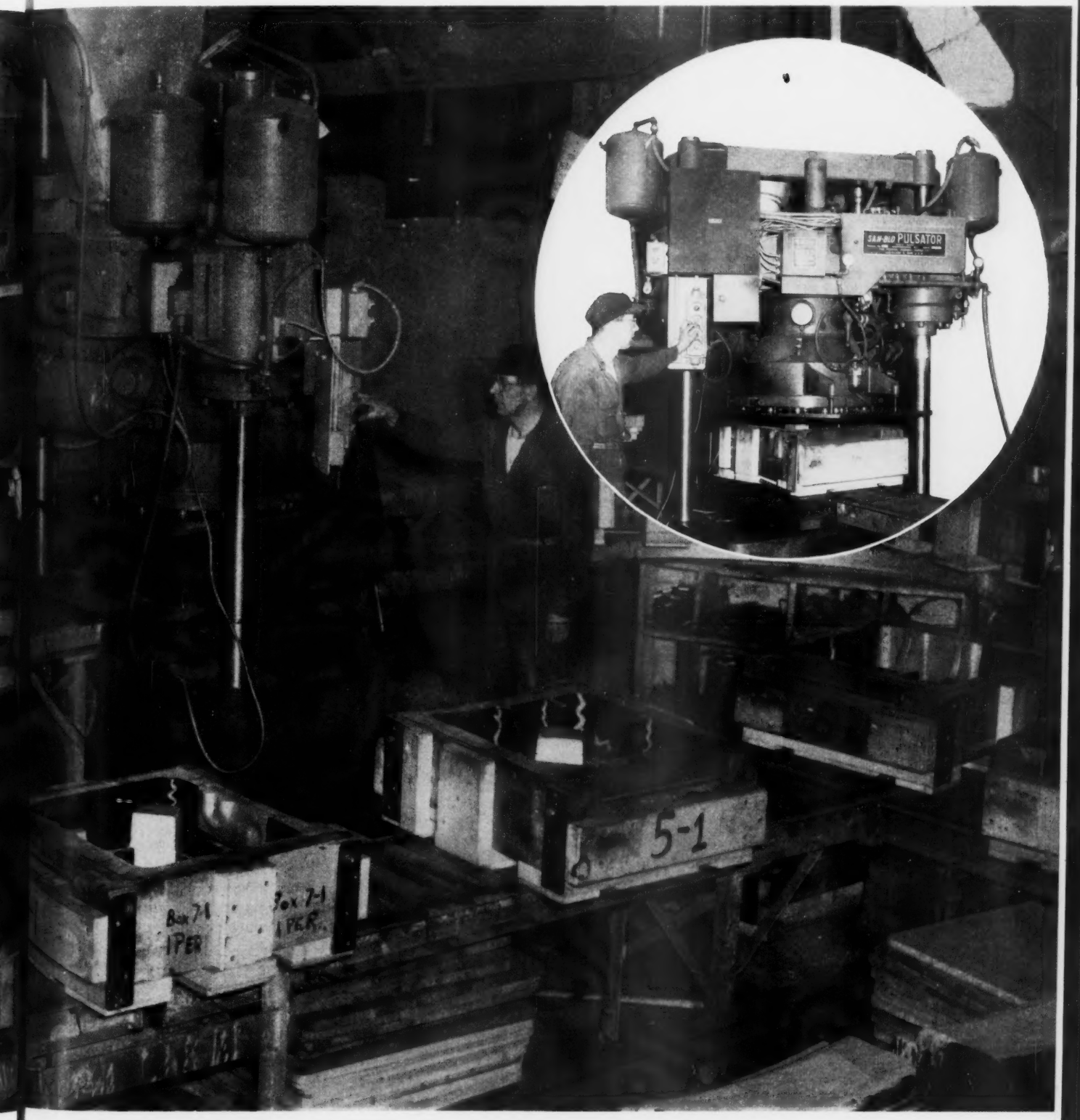


San-Blo Division

with the SAN-BLO!

flexibility possible—assuring uninterrupted production on these twelve boxes by *eliminating* the changing of blow plates. Blow hole arrangements in the twelve boxes vary to some degree. But, they are similar enough for the same blow hole pattern in the universal blow plate to satisfy the requirements of each box. When different blow hole arrangements are required for *other* core boxes, the blow hole pattern in the blow plate may be changed *without* dropping the sand in the sand chamber.

The SAN-BLO will blow molding sand, oil sand and resin bonded sand with maximum efficiency and is equipped with "Pulsator" and "Low Pressure Prefill" units for blowing wooden boxes safely, with negligible wear. There's no other core blower with the cost reducing potentials of the SAN-BLO! So, why not find out what it will do for *your* core room problems? Write us about them, today!



The **FEDERAL FOUNDRY SUPPLY** *Company*

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sistance; its vibration damping qualities; the ease with which it is designed for simplicity and good appearance; its toughness and ductility; its easy machinability; its strength; and its impact resistance.

Many points were offered by the spokesmen assigned for the various groups, including these: Castings can be straightened and coined. Tool life is longer. Less machining is required. Malleable lends itself to punching. Less draft is necessary. Malleable stands up under vibration. It can withstand corrosion to a greater degree than many other metals, can be cast closer to finished dimensions and has a good finish. Many other points also were taken up, as well as specific sales techniques designed to impress them on potential buyers.

Dinner speaker on Apr. 7 was Will A. Foster, vice president, Borden Cheese Co., New York, who spoke on "Opportunity Is Knocking for Salesmen." Mr. Foster stressed that salesmen are an integral part of any free economy, since dictatorships cannot permit competition or dissatisfaction. In addition, they can exist only in an economy of abundance. They should, he pointed out, be industry salesmen as well as brand salesmen.

The session on Apr. 8 was opened by a talk on "Selling Techniques" by Frederick W. Dow, training director, Dow Chemical Co., Midland, Mich. Mr. Dow noted that the day of the "tough-sell" is here and that it brings back with it the day of the "creative salesman." To stay and to grow in competitive times, any company needs salesmen who know how to sell and like to do it. A great difference exists, however, between cut-throat and creative types of competition.

Good selling is based on planning, on getting an idea and planning the use of it. Selling must be mapped out like a campaign. Time with the customer is what counts, and every call must be planned. Creative selling encourages needs the customer isn't aware of. Its goal should be to make the sales "pie" bigger, not just to try for a bigger slice of the same pie. Specifications should be used in terms of customer benefits, not for their own sake.

Cites Salesmen's Attributes

Salesmen need four characteristics —ability to think creatively, emotional stability and maturity; insight into themselves and others and dominance and leadership. Good ones rate high on these points—technical ability, personality and, most importantly, service to customers. They should have something constructive to offer purchasing agents, develop the confidence of buyers, never abuse a client's confidences, follow up calls with letters, sell in depth, time calls, entertain judiciously, follow up on sales and keep purchasing agents informed.

C. H. Ker, president, Dalton Foundries Inc., Warsaw, Ind., and president, Gray Iron Founders' Society, spoke to the group next and advised it, "We Are Selling a Service." Too often, he stated, castings are bought, not sold. Regarding pearlitic malleable, he emphasized that standard malleable should not be sold short. Pearlitic should be sold where it is called for, but not where standard will do the job. Regardless of which metal is sold, test and design facilities should be used to insure that the best castings possible are sold for a given application.

The next item on the program consisted primarily of contributions from the audience. Roger Griswold, Erie Malleable Iron Co., Erie, Pa., spoke briefly on "Conversions—the Lifeblood of Our Industry," then called for descriptions of specific conver-

Saves 4 minutes per casting

ROTOR B-7 VERTICAL GRINDER pays for itself in 9½ weeks

JOB: Removing parting lines and general cleaning of large pipe fittings with disc cut-off wheel.

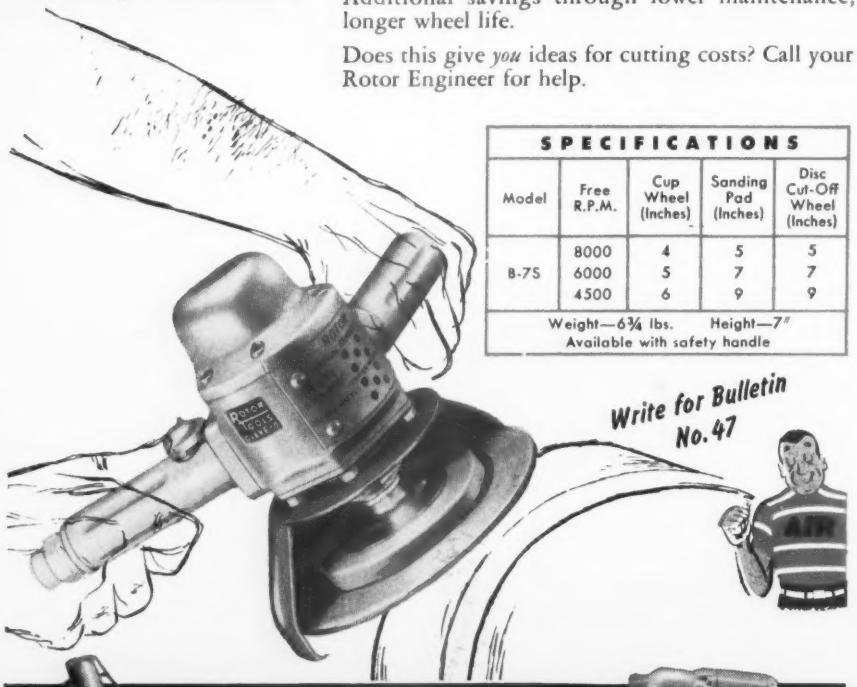
FORMERLY: An ungoverned, geared tool did the job . . . took 14 minutes per casting.

NOW: Lighter B-7 Vertical Grinder with direct-acting governor gives constant, controlled speed . . . cuts grinding time to 10 minutes.

RESULTS: Saves 4 minutes per casting. Used 75% of production time, tool paid for itself in 9½ weeks. Additional savings through lower maintenance, longer wheel life.

Does this give *you* ideas for cutting costs? Call your Rotor Engineer for help.

SPECIFICATIONS				
Model	Free R.P.M.	Cup Wheel (Inches)	Sanding Pad (Inches)	Disc Cut-Off Wheel (Inches)
B-7S	8000	4	5	5
	6000	5	7	7
	4500	6	9	9
Weight—6¾ lbs. Height—7" Available with safety handle				



Write for Bulletin No. 47

EVIDENCE OF EXPERIENCE

On Our 10th Anniversary

We would like to thank the Foundry Industry for its confidence...

We would like to thank all of our clients for the opportunities and privileges to work with them to modernize their methods and facilities and to design complete new, up-to-date plants.

We also appreciate the opportunity to successfully apply automation to a number of different types of foundry products—and to assist management to establish more economical procedures for the control of operations and costs.

The next 10 years will see even more important developments in the foundry industry—metallurgically and technologically. We look forward to playing a small part in making the foundry a better place to work and in making it possible to insure an adequate return for workers, management, and owners.

Knight Engineers have completed more than 500 successful assignments in such fields as:

Foundry Engineering
•
Architectural Engineering
•
Construction Management
•
Organization
•
Management
•
Industrial Engineering
•
Wage Incentives
•
Cost Control
•
Standard Costs
•
Flexible Budgeting
•
Production Control
•
Modernization
•
Mechanization
•
Methods
•
Materials Handling
•
Automation
•
Surveys

On May 1st, the Knight organization will move to its new offices in the Knight Building, 549 West Randolph Street, Chicago 6, Illinois

Lester B. Knight & Associates, Inc.

Management, Industrial and Architectural Engineers

MEMBER OF THE ASSOCIATION OF CONSULTING MANAGEMENT ENGINEERS, INC.

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sions achieved by members. Mr. Griswold stated that there should be new areas for conversions, which means getting new work into castings, not fighting among foundrymen for the same piece of work.

Examples supplied by the audience were numerous and covered a large variety of converted work, with perhaps more emphasis on weldments than on any other form of fabrication. Many persons had brought either castings or photographs and put them on exhibit. One conversion was reported to amount to 20 per cent of the production of the foundry which obtained it. It was generally agreed that most conversions are obtained by watching for fabricated parts that seem susceptible to being cast in malleable iron.

Following the discussion of conversions, a talk on "A Customer's View of the Industry" was presented by Thomas Logan, Caterpillar Tractor Co., Peoria, Ill. Formerly manager, engineering and cost analyses, Mr. Logan on Apr. 1 became assistant purchasing agent. He stressed that malleable founders have a very versatile material to sell and noted that up to a ton of malleable castings are used in his firm's tractors. Malleable's advantages include castability, machinability, hardenability properties, ductility, corrosion resistance, good finish, high ratio of yield strength to ultimate strength and freedom from residual stresses. Its drawbacks include difficulty of welding or brazing the metal in fabrications and a lack of uniformity in malleablizing heavy sections.

The greatest single cause of resistance to purchase of castings, however, is casting defects, in all types of metal. Defects prevent use of castings by consumers who would like to buy and use them. It would pay, Mr. Logan said, for foundries to install technical aids to stop scrap, but the least foundries can do is to keep their scrap at home by providing better inspection methods. Engineers often tend to view all castings with suspicion because of unsoundness—unsoundness caused by production errors, not by factors inherent in the casting process. Today, he said, foundries face a twofold problem: Producing better castings and overcoming sales resistance in the minds of engineers who have lost confidence in castings because of their defects.

Casting Use Will Increase

A Dartnell Corp. film on "How to Sell Quality" served to underscore a point made frequently during the conference—namely, that the industry needs to produce a quality product fairly priced as the result of good costing methods.

Concluding speaker was Glenn W. Merrifield, Giffels & Vallet Inc., Detroit, who took "A Look into the Crystal Ball—1975." Mr. Merrifield foresaw a future in which the population would exceed 200,000,000 and the national income would reach $585 billion. He saw changing markets, but predicted increased casting sales in all types of metals, including malleable iron.

At the close of the formal sessions, Lowell D. Ryan, managing director, and J. H. Lansing, technical and research director, Malleable Founders' Society, presented a summary of the conference and asked for comments which would help the society decide what the industry wanted on the program at future market development meetings.

Final event of the conference was a dinner Friday, Apr. 8, at which the Belle City Malleable Iron Co. male glee club, a group of over 30 employees of the company, appeared.

Cut foundry operating costs . . .

Transite Core Plates are strong and durable . . . resist warpage, impact and abuse, provide long service life.

with Transite Core Plates and Slip Jackets

"Johns-Manville Transite* Core Plates help assure maximum production in minimum time"—that's the experience of foundrymen who have used them for years. Made of asbestos and cement, they are light in weight, yet strong and durable. Being non-metallic, they resist corrosion, maintain their smooth surface and can be easily cleaned.

Transite Slip Jackets are a companion product with similar advantages. They do not burn, retain their original shape despite runouts. Slip jackets are furnished in both white and black types. The latter is widely used as a protective liner for metallic slip jackets.

FREE . . . New Folder gives complete details on Transite Core Plates and Slip Jackets—as well as Transite Pallite products for dielectric furnaces. For your copy of folder PP-31A, write Johns-Manville, Box 60, New York 16; in Canada, 565 Lakeshore Road East, Port Credit, Ontario.

Transite Slip Jackets cost less than other types . . . last longer, too. Result—important savings for foundries.

*Reg. U. S. Pat. Off.

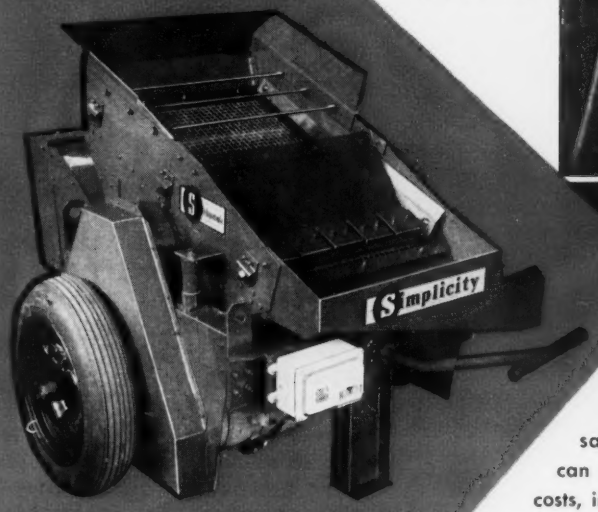
Johns-Manville TRANSITE CORE PLATES AND SLIP JACKETS

See us at Booth 2032-2034 Materials Handling Exposition, Chicago, May 16th to 20th.

SIMPLICITY PORTABLE SAND CONDITIONERS INCREASE PRODUCTION —LOWER COSTS

SCREEN, AERATE AND FLUFF IN ONE OPERATION

A SIMPLICITY 4' x 4' Portable Sand Conditioner in operation at Brown Industries Foundry, Sandusky, Ohio. Note the front end loader which is also employed to move the unit.



This SIMPLICITY 2' x 3' Portable Sand Conditioner handles 10 to 15 tons of molding sand per hour—all the sand two men can shovel. The two-wheeled model pictured, is equipped with pneumatic rubber tires 24 inches in diameter. It is especially designed for foundries with sandy or uneven floors. Three wheel solid rubber tired models also available for foundries with hard surface floors. Screen sizes on other models range from 12" x 18" up to 4' x 8'—capacities from 8 to 60 tons per hour.

Foundries without a regular sand handling system can reduce sand handling costs, increase production, and improve the quality of their castings by installing SIMPLICITY Sand Conditioners. Designed for operation on side floors or main bays without sand systems, these compact, portable units screen out hard core butts, chills, gaggers, nails and other pieces of metal and break down hard lumps and balls into finely screened useable sand, thereby eliminating sand waste. In the same operation, the sand is thoroughly aerated and fluffed, producing molding sand with a high degree of permeability. The result: good, clean castings that require less shakeout and finishing time; fewer rejects and less scrap. Experienced foundrymen report that the savings made possible through the use of a SIMPLICITY Sand Conditioner will more than pay for the unit in six months or less.

CONSULT A SIMPLICITY SALES REPRESENTATIVE OR WRITE US TODAY FOR FULL INFORMATION.

156

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ENGINEERING COMPANY • DURAND 7, MICHIGAN

Sales Representatives in all parts of the U.S.A.

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Around the Country

NEWS REPORTS FROM

Chicago . . . New York . . . Los Angeles . . . Philadelphia

Philadelphia— Gray iron business is picking up a little but is still disappointing to foundry operators. Most jobbing shops are operating four days a week. Foundries specializing in structural requirements, especially pipe, are doing better, and are bringing the general average of gray iron output up to around 70 per cent. Order backlogs at the jobbing foundries range two to three weeks.

Steel foundry output has made relatively greater gain than gray iron. Average is estimated in excess of 75 per cent of normal, with backlogs ranging as high as five weeks in some cases. Betterment is due primarily to some lift in capital goods requirements. However, there is still a lag in railroad and government buying.

Hardware and pipe fittings are contributing to good operations at malleable shops, where operations are said to be close to 100 per cent of normal. Adding also is a seasonal gain in agricultural equipment needs and a light improvement in railroad business. Delivery promises range around six to eight weeks.

The larger brass shops seem to be doing fairly well on a miscellaneous assortment of tonnage. But activity among the small shops remains spotty, with operations ranging three to four days a week, against close to five days for the others. Light metal shops are doing well, largely because of aircraft and radar requirements.

Los Angeles—With demand for castings higher than at any time this year, most foundrymen are optimistic regarding first half prospects. Most foundries report activity higher than a month ago—and far better than expectations.

Foundry melting rates, climbing consistently, are now near 100 per cent of total capacity for most steel foundries, only slightly less for nonferrous shops. All are on five-day work weeks, with some overtime on special jobs, mostly seasonal projects. Light casting producers, unhappy over prospects when 1954 ended, are also working full work weeks.

Inquiries are more numerous from a wide range of casting users, assuring a continued high level of activity. Most foundrymen say they can turn at least a third of their inquiries into sales.

Backlogs continue to lengthen. Some shops report backlogs of six weeks, compared with about four weeks early in the year.

Supplies of foundry scrap are adequate, although one steel foundry was forced to purchase a large quantity of midwestern pig iron to overcome a temporary local shortage. Most operators are holding scrap purchases close to current needs.

Only dark spot in the foundry picture is reported by pump manufacturers, usually a good market for castings. The usual seasonal upturn has not appeared, although most pump people are hopeful that the seasonal influences merely have been postponed; other trade observers feel the slump will continue.

New York—Gray iron casting business is about on a parity with that of the better weeks of last fall. But this doesn't mean too much, for business even then was spotty. It is doubtful if operations average more than four days a week, with working forces limited. Machine tool needs are a little more active and have helped at least one shop to extend its operating schedule from four to five days a week. On the average, job shop deliveries can be made within two weeks.

Such malleable capacity as there is in this area seems well engaged, and steel casting sellers are making out all right. There is no longer much steel casting capacity in this area, however.

Activity among the brass and bronze shops is increasing substantially. Over-all production at these shops is estimated at 30 to 40 per cent over the average rate of a year ago. Reflecting this improvement is the assertion in reliable quarters that March was the best shipping month for brass and bronze ingot manufacturers since early 1951. April also, it is believed, will make an excellent showing in this particular field.

Captive foundries producing meters, hardware and plumbing supplies, valves and ship propellers are active, with work overflowing to independent shops. These shops also are turning out a fairly substantial amount of pump work. Interesting now is the casting of ship propellers from aluminum-nickel bronze on a production basis. Aluminum foundry production is still bolstered heavily by aircraft and radar requirements. However, there is an increasing amount of miscellaneous work, including oil burner bodies, paddles for washing machines, etc.

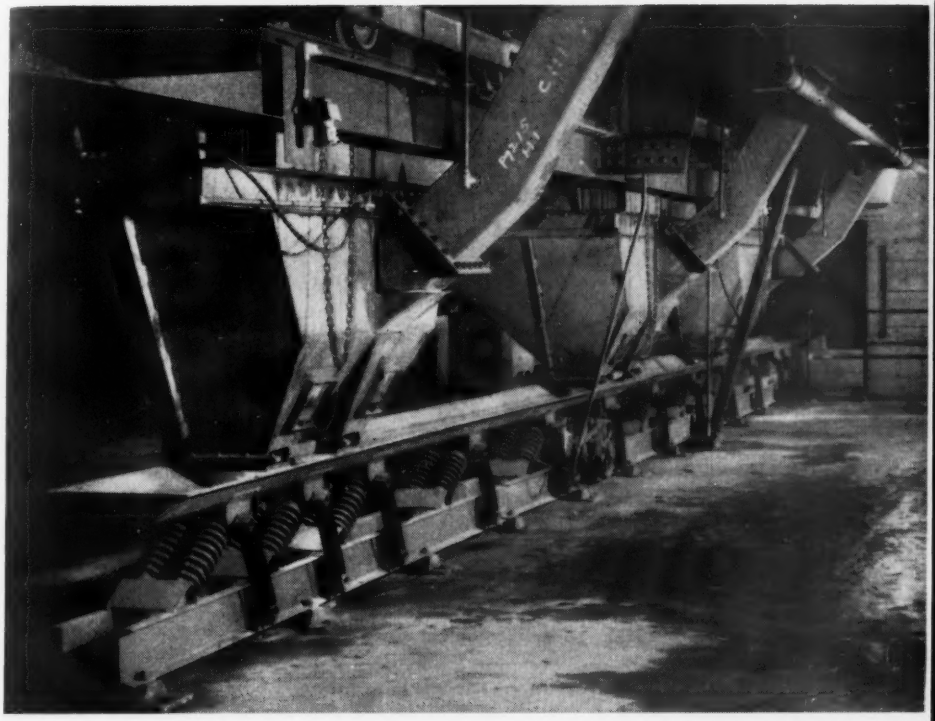
Chicago—Gray iron and malleable iron foundry activity was at a good level in April, and prospects are that May will hold the pace. There has been a slow but steady climb since late last year, but there are reasons to believe that leveling off either has arrived or is close at hand. It could be that the high point in castings demand for the year has been attained.

Pacing requirements for castings has been the record-breaking assembly of automobiles. Scheduling for second quarter is even higher than first quarter. Unfortunately, however, these conditions haven't provided good business for all foundries. Foundries captive to the automotive industry are operating at rates considerably better than independent jobbing shops.

It is nothing new for jobbing foundries to be on the short end, but it is a matter of growing concern that the gap between activity curves for captive and independent shops has been widening steadily since end of World War II. Many reasons for this can be cited but it all boils down pretty much to unit costs. The smaller independents simply can't match the low manufacturing costs of the large, highly-mechanized, mass-production automotive foundries.

Consequence is that cost-conscious automakers have expanded their facilities and today are producing a

HOW TOUGH CAN CONVEYING GET?



A 55' Carrier Heavy Duty Conveyor. Capacity: 20 tons-per-hour of hot sintered coke. One 5 HP drive.

Check this list . . . see if you know of a material that is harder to handle than any of these.

ROCKET FUEL POWDER
HOT CEMENT CLINKER
FLY ASH
DRIED SEWAGE SLUDGE
COKE BREEZE
DRY CALCIUM CARBIDE
TITANIUM DIOXIDE
WET SUGAR
SILICON-CARBIDE
MACHINE TURNINGS
SINTERED ORE
SLAG
CORROSIVE CHEMICALS
FRAGILE CRYSTALS

THE materials at right, above, have *one* thing in common: they are all being conveyed efficiently and economically with Carrier Natural-Frequency Conveyors.

Here's why plants processing these materials turned naturally to Carrier Natural-Frequency:

> **A lot of the materials had proved too sharp or oily for belt or flight conveyors. Others were so sticky they made screw conveyor cleaning a maintenance nightmare. Still others were too abrasive for apron and conventional vibrating conveyors. Some were subject to spillage in *any* ordinary conveyors.**

Carrier Natural-Frequency Conveyors solve all these problems. These amazing conveyors substitute the natural resonant action of coil springs for brute force. They require little, if any, more power to operate, empty, than to run the motor alone. And remember, *the lower the power requirements, the lower your maintenance.*

If you've got a material that's giving you conveying troubles of any kind, just jot it down on the coupon. The Carrier Natural-Frequency Conveyor may solve yours.

CARRIER NATURAL-FREQUENCY VIBRATING EQUIPMENT

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Gentlemen: We've been having trouble with_____

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_____. Without obligation, please send Carrier Natural-Frequency Bulletin No. 111.

Firm_____

Street_____

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Att: Mr._____ Dept._____

rising proportion of their casting requirements. The jobbing shops frequently can't find replacements for this lost tonnage.

Now the independents face a further threat in the same direction with the United Automobile Workers' Union seeking the guaranteed annual wage. Should the union win all or part of this demand, it is feared that automobile manufacturers would step up the integration of their plants and make more of their own components to keep their own work forces occupied during slack seasons. Thus the volume of castings farmed out would shrink even more.

* * *

John L. Holloway, president of Crane Co., Chicago, has been named by Junior Achievement of Chicago as general chairman of the ninth annual Junior Achievement Future Unlimited banquet to be held at the International Amphitheatre, May 5. This is a deserved recognition to Mr. Holloway, who has taken a personal interest in this youth program by serving on the Chicago area advisory council. It is also a recognition to the company he heads, for as pointed out in this column for February, page 198, Crane Co. for five years has sponsored J. A. companies, all of which have produced castings.

Program for ASTM Meeting Includes Six Symposiums

Program for the annual meeting of the American Society for Testing Materials to be held in Atlantic City, N. J., June 26 to July 1, is well under way. It will be held at Chalfonte-Haddon Hall and will include six symposiums.

The Edgar Marburg lecture will be presented by Dr. Walter J. Hamburger, Fabric Research Laboratories, Boston, and will deal with the properties of textile fibers. Prof. Fritiz V. Lenel, Rensselaer Polytechnic Institute, Troy, N. Y., will deliver the annual Gillett lecture in which he will discuss metal powders.

Symposiums, covering a variety of topics, include "Speed Testing of Non-Metallic Materials," "Impact Testing," "Atmospheric Corrosion," "Metallic Materials for Service at Temperatures Above 1600°F," "Interpretation of Soil Test Data" and "High Purity Water Corrosion." Symposium on testing of nonmetallic materials will provide eight papers for discussion. On impact testing 12 papers will relate to such subjects as stress-strain relations, v-notch Charpy test, notched-bar testing, low-temperature testing, dynamic characteristics of impact machines, impulse loading, and strain propagation. Nine papers on various phases of atmospheric corrosion will be presented at that symposium.

A selection of papers is being made for the symposium on metallic materials for service above 1600° F. Interpretation of soil test data will be described in four papers, while papers in the high-purity water corrosion symposium will deal with effect of material composition, water environments, study of steels, preparing and maintaining high-purity water, and engineering problems.

Industrial Heating Equipment Group Sees Better Business

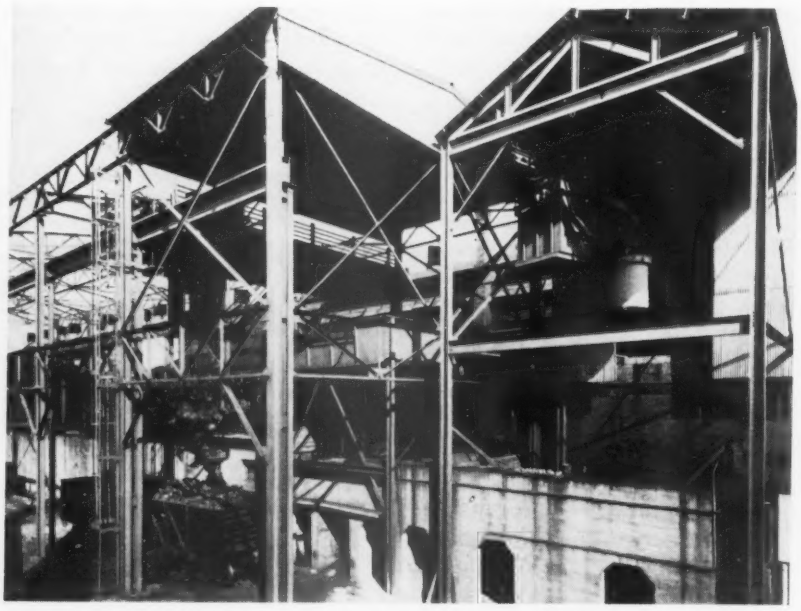
Members of the Industrial Heating Equipment Association in Detroit, Jan. 24-25, indicated a possible 10 to 15 per cent increase in business for 1955. Improvement is based partly on the belief that manufacturers using heat treating furnaces will undertake to expand and modernize facilities to meet competitive conditions. Furthermore, industry is doing more heat treating.

K. M. Patterson, industrial sales manager, Westinghouse Electric Corp., Pittsburgh, in looking ahead at the industrial market, stated that "the foundry industry, which for a long time needed a cost reduction gimmick, found it in automation." Mr. Patterson stated that his company now casts the frames for its new line of a-c motors.

Horace Drever, president, Drever Co., Philadelphia, was named president, succeeding L. H. Gillette, manager, industrial heating sales, Westinghouse Electric Corp. Elton E. Staples, executive vice president, Hevi Duty Electric Co., Milwaukee, was named vice president and director. Treasurer is R. E. Whittaker, secretary, Swindell-Dressler Corp., Pittsburgh. Other new directors are W. H. Holcroft, executive vice president, Holcroft & Co., Detroit, and W. E. Benninghoff, vice president, Ohio Crankshaft Co., Cleveland.

Laboratory Directory Revised

A Directory of Commercial and College Testing Laboratories has been revised and made available by the American Society for Testing Materials. Directory provides information as to location of testing laboratories together with types of commodities and nature of investigations the laboratories are prepared to undertake. Copies at $1.00 each may be obtained from ASTM, 1916 Race St., Philadelphia 3.



MECHANIZED CHARGING: At the Cooper-Bessemer Corp. foundry in Mount Vernon, O., only three men are required for make-up and charging. One man operating a Whiting crane, left, loads the storage bins. Charges are made up and weighed in batch hoppers, then discharged into cone-bottom charging buckets. In the upper right portion of the photograph a Whiting monorail charger is pictured moving the charging bucket into the cupola

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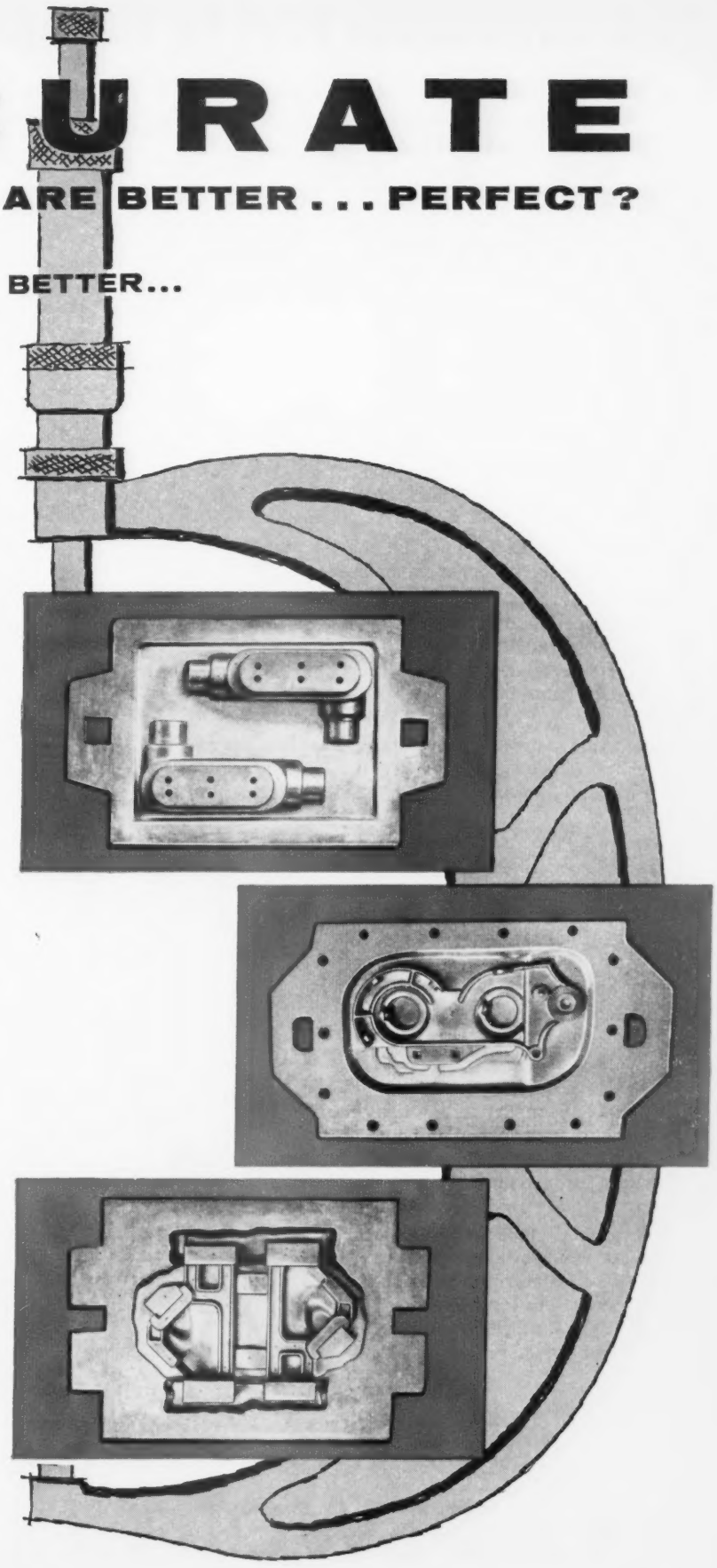

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Stock Core Machine Pays for Self Again and Again and Again!

Simple to operate—apprentice makes cores faster with new, improved "Rapid" Core Extruder—does work of four or five skilled core makers making cores by hand and using dryers.

Here is a practical and economical unit for making perfect stock cores—the "RAPID" CORE MACHINE. Properly mixed core sand falls into the throat of the machine and is forced through a brass tube by a screw conveyor. Formed core is automatically vented. Hand operated or motor-driven, it saves time and money.

Note these features:

1 Set screw controls adjustable force feed rod and mixer for uniform feeding for all size cores.

2 Specially formed hopper lip makes possible the use of an auxiliary hopper when needed.

3 New, specially shaped hopper with adjustable feed rod prevents sand from collecting in pockets; runs clean.

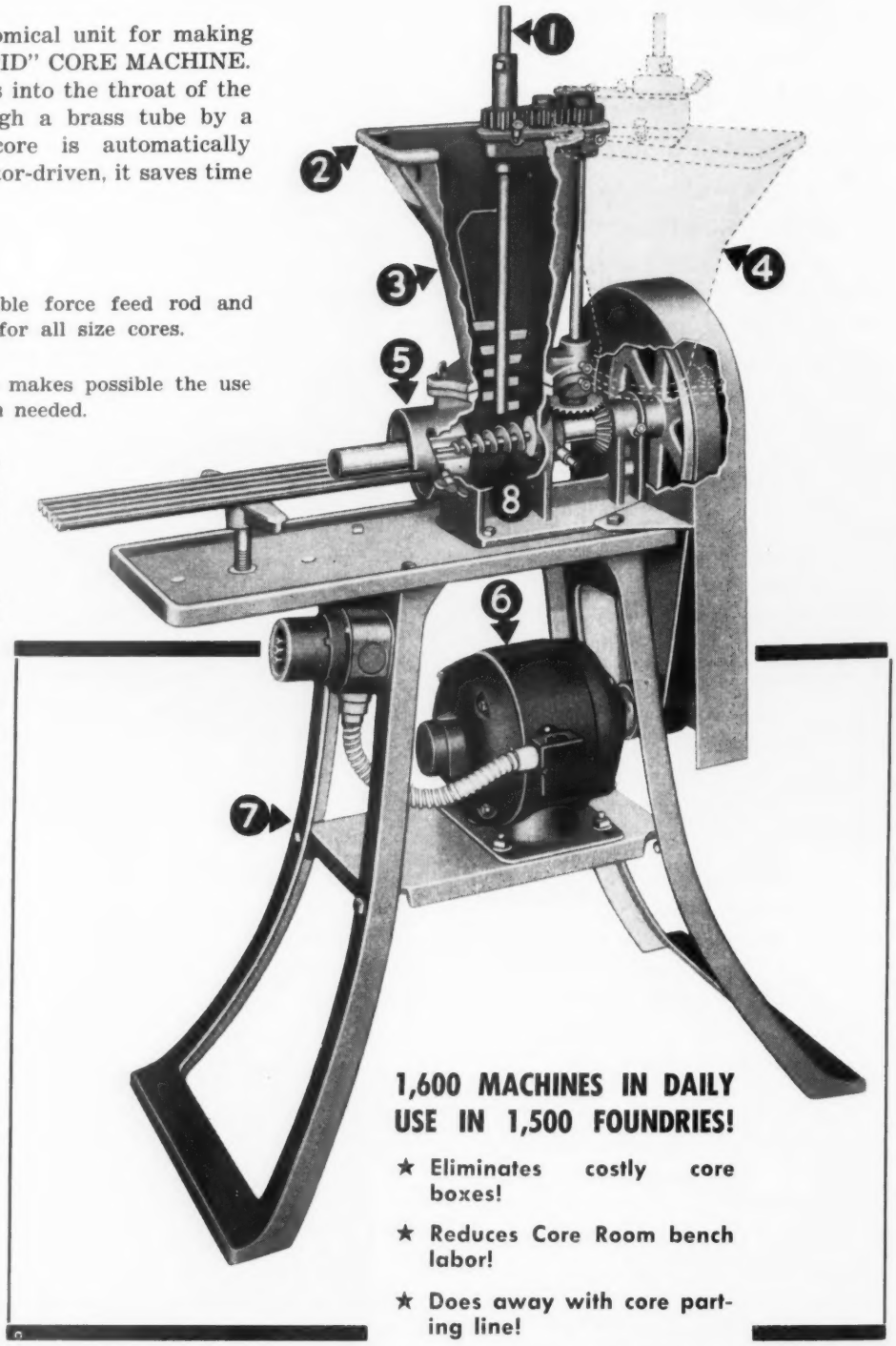
4 Swinging hopper permits ready access to working parts; facilitates cleaning.

5 The tubular die holder, by easy adjustment of tube length permits correct core density for all size cores. Saves time.

6 Adaptable. May be motor driven direct, belt driven or hand operated.

7 Sturdy cast stand with adjustable core tray rest. When machine is furnished without stand, core try holder is secured to machine base.

8 Straight tapered double twist conveyor is self-seating and self-centering, minimizing tube and conveyor wear, and assuring accurately formed cores.



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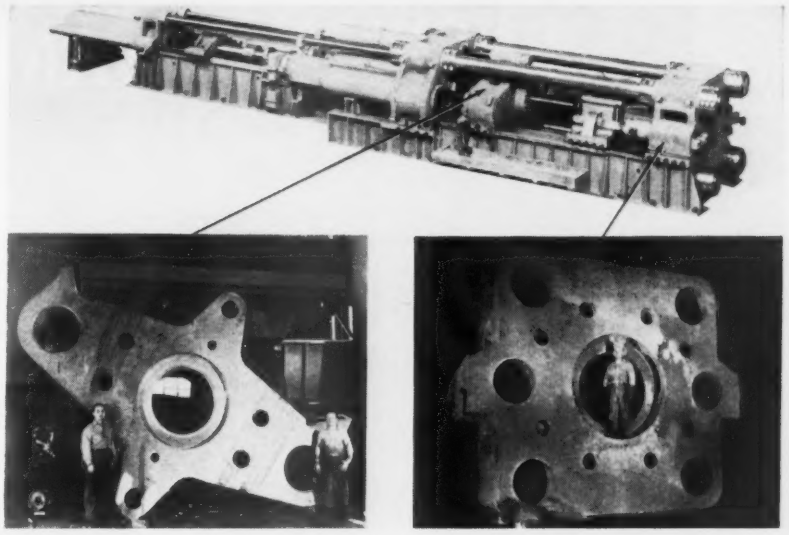
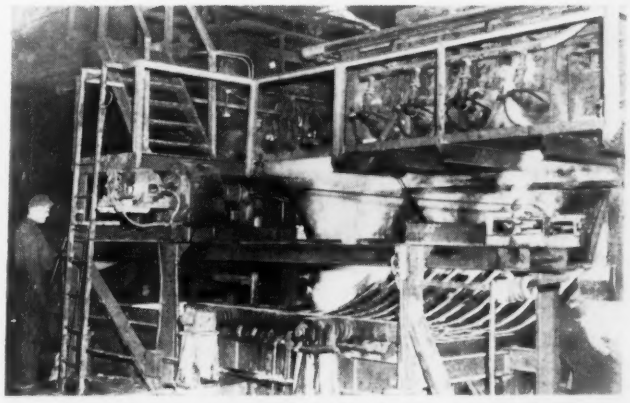
News Views



BIG STRETCH: Largest extrusion press ever built in the United States, working model shown above, is being installed at Harvey Aluminum plant, Torrance, Calif., as part of the Air Force heavy press program. Major castings in the giant press are the crosshead (lower left) and the platen (lower right). The latter weighs 393,000 lb. The press will produce aluminum extrusions of unprecedented size, weight and length



LONGER LIFE: Redesigned skid discharge rails in slab and billet reheating furnaces at Chicago plant, Ingersoll Steel Division, Borg-Warner Corp., from medium manganese steel to a cast nickel-chromium alloy, has more than doubled life of skids. A weight saving of about 35 per cent has been effected. Furnaces operate at about 2300° F, and usual temperature at the rails is about 1800° F

NO ACCIDENT: Robertshaw-Fulton Controls Co., Scottdale, Pa., has won first place in a National Safety Council contest in Group C, Foundries Division, with record of 12 months without a disabling or lost-time accident. A. J. Stinebiser, superintendent, left, and Steve Hollis, president, Local 3964, CIO-UAW, admire winner's award

STEEL FOUNDERS' MEETING: Speakers at one of the sessions of the recent annual meeting of the Steel Founders' Society of America are shown here with its president (right), A. J. McDonald, American Steel Foundries. Standing, left, is Bernard Ames, Columbian Bronze Corp., Freeport, Long Island. Seated, left to right, are Colin Carmichael, editor, *Machine Design*, Cleveland, and Clement J. Freund, dean of engineering, University of Detroit. A detailed report on the meeting is given elsewhere in this issue

PNEUMATIC SAND RECLAMATION

Superior Foundry Company cuts new sand consumption by 60%

Last year Superior Foundry Company, Cleveland, Ohio, installed a National Pneumatic Sand Recovery System. Here's their progress to date:

ON CORES

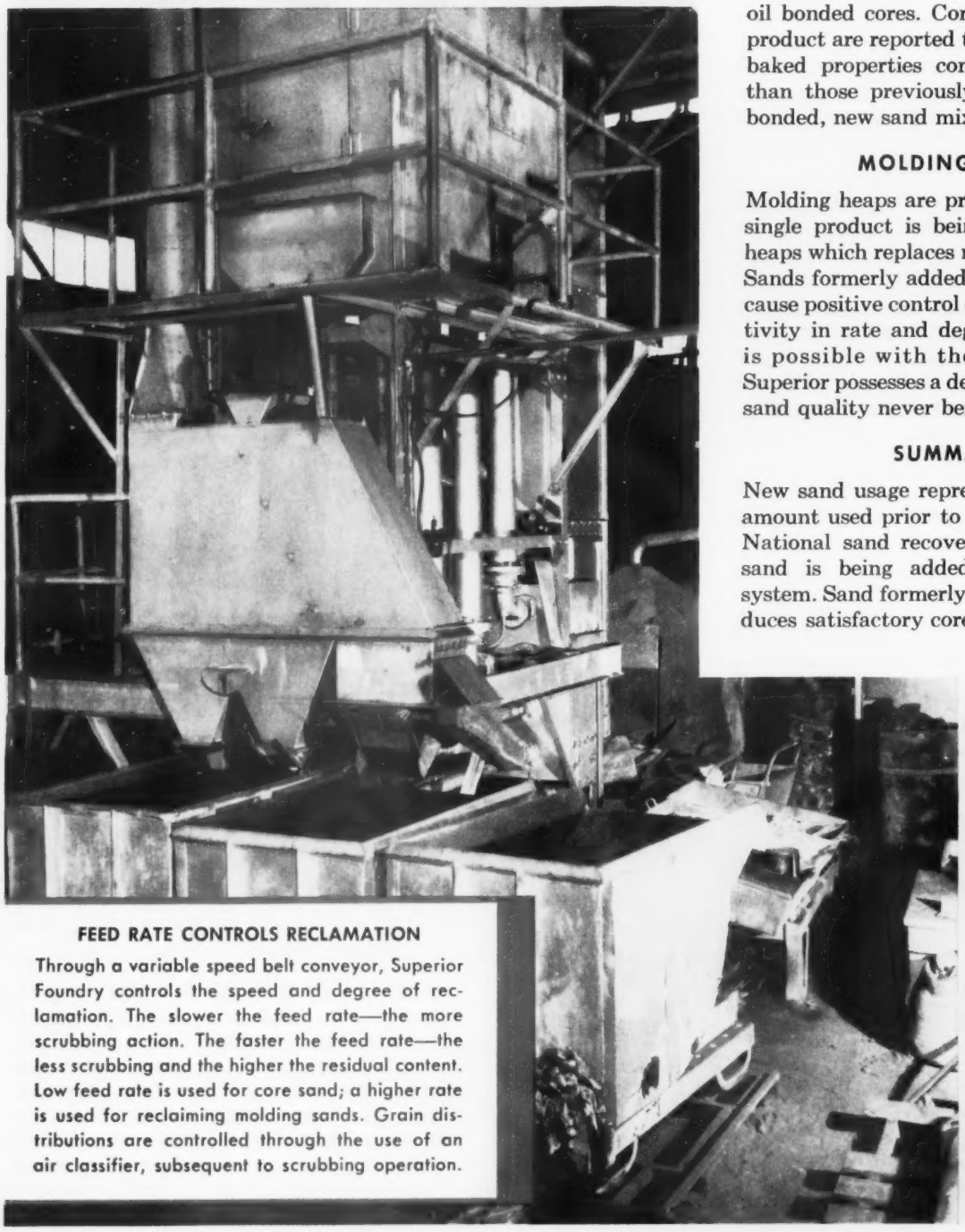
About 90-95% of the waste core knockout sand fed into the system is being reclaimed for use in place of new sand for oil bonded cores. Cores of the reclaimed product are reported to possess green and baked properties comparable, or *better*, than those previously made from, like-bonded, new sand mixtures.

MOLDING SAND

Molding heaps are processed at night. A single product is being returned to the heaps which replaces new Lake and Bank Sands formerly added to the system. Because positive control over fines and selectivity in rate and degree of reclamation is possible with the National Unit, Superior possesses a degree of control over sand quality never before possible.

SUMMARY

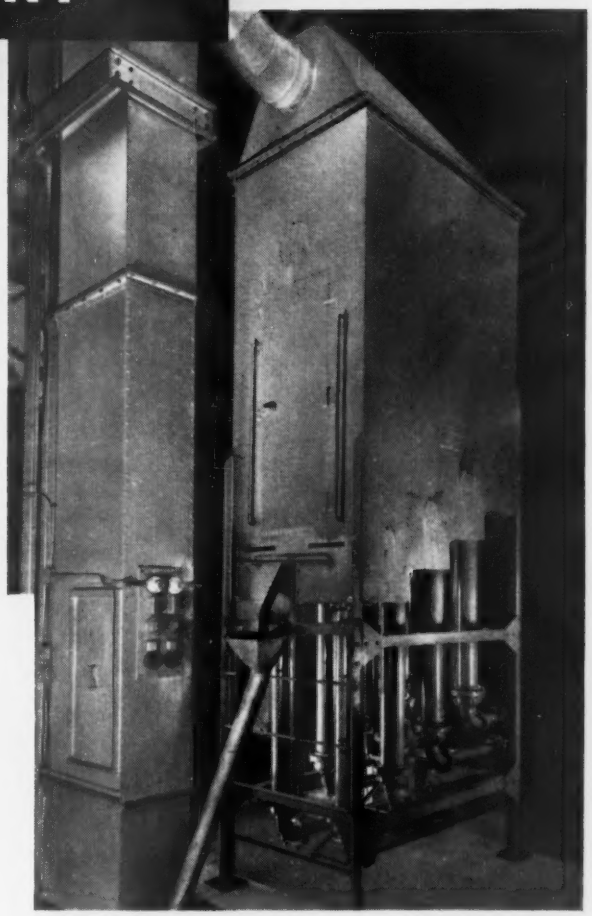
New sand usage represents only 40% of amount used prior to the addition of the National sand recovery system. *No* new sand is being added to the molding system. Sand formerly discarded now produces satisfactory cores.



FEED RATE CONTROLS RECLAMATION

Through a variable speed belt conveyor, Superior Foundry controls the speed and degree of reclamation. The slower the feed rate—the more scrubbing action. The faster the feed rate—the less scrubbing and the higher the residual content. Low feed rate is used for core sand; a higher rate is used for reclaiming molding sands. Grain distributions are controlled through the use of an air classifier, subsequent to scrubbing operation.

IN GRAY IRON FOUNDRY

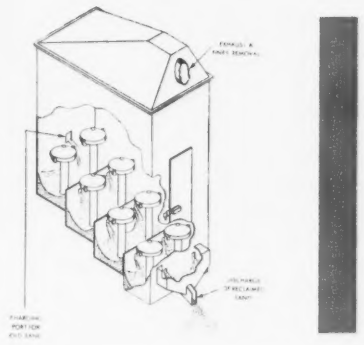


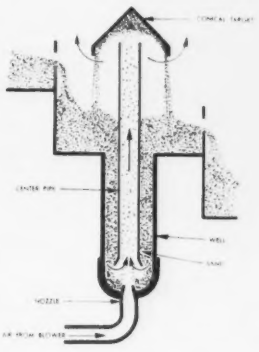
THE NATIONAL PNEUMATIC SAND RECOVERY SYSTEM

Using *low pressure air* (4.0 PSI and less) as its motivating agent, and the sand grains themselves as the abrasive body, National's Pneumatic Sand Recovery System is the first practical method for bringing controlled, *economical* reclamation within the budget of foundries everywhere. Simple in design and construction, operation and control, the National Scrubber requires little floor space, no additional labor and can be readily integrated into most sand handling systems.

There's no sludge disposal problem or plumbing worries. High recovery and low initial cost are combined with low maintenance to contribute tremendous savings over a short period of time.

Write for details today, or ask your National agent to show you savings figures, as reported by present users.

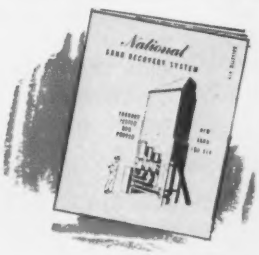




NO MOVING PARTS TO WEAR. HERE'S HOW AIR DOES THE WORK!

The National Recovery Unit is comprised of a sequence of scrubbing cells. A turbine type blower supplies a high velocity air stream to elevate the air/sand mass through a vertical center pipe. As they collide with other grains within the peak of the conical target, individual sand grains act as the abrasive. The sand grains fall back to the main sand mass while the air escapes upward at the periphery of the "targets" and carries fines and particles of grain coatings to be removed by the exhaust unit. Control of fines may be adjusted by varying the exhaust velocity.

Small openings in the partitions between successive cells permit sand passage onward to succeeding cells. The rate at which the grains pass through a cell sequence is directly related to, and controlled by, the rate at which sand is being fed into the scrubber.



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PRODUCTS OF A PRACTICAL FOUNDRYMAN

Foundry Developments

By EDWIN BREMER
Metallurgical Editor

DETAILED information on various steps in production of castings made from the 90 Al-10 Mg alloy is presented in a 122-page bulletin available from the Office of Technical Services, Washington 25. It is designated report PB-111577 and entitled "Foundry Manual for Sand Casting Aluminum-10 Per Cent Magnesium Alloy." In mimeograph form the price is $3.25. Investigations upon which the report was prepared were conducted by Battelle Memorial Institute in co-operation with Frankford Arsenal.

Shell Molding

INVESTIGATION of "Shell Molding Materials: Their Testing and Properties" by D. A. Taylor as published in the December issue of the *Journal of Research and Development* (Birmingham, England) describes data obtained on six different sands and four different resins. Some of the conclusions are that strength of shells when cold is directly proportional to the amount of resin added to the sand. Strength of shell molds when cold is not affected by curing at temperatures between 356 and 608°F. There is considerable difference between strengths obtained with various sands; within certain limits the grading and grain shape of the sand do not have such a marked effect as the amount of clay present in the sand. Clay content of the sand markedly affects strength of the shells; an addition of 1 per cent weak ball clay gives a 25 per cent reduction in strength. Volume of gas evolved on heating molds is directly proportional to the quantity of resin used as the bond.

Little Pigs to Market

IMPROVED iron pig or ingot just being introduced to the foundry trade by Hanna Furnace Corp. Division, National Steel Corp., is flat rather than the traditional trapezoidal shape. It measures 1⅜ x 5¾ x 6½ in., and weighs between 9 and 11 lb. The new ingot as well as the usual size pig will be available in all grades of merchant and silvery iron. Advantages claimed by the maker for the material are no free carbon pockets, no shrink, finer grain structure, better mix and faster melt with lower coke consumption, easier handling, larger load per magnet and less breakage, and more compact storage.

Colder than Cold

METALLURGISTS at the Research Laboratories of Westinghouse Electric Corp. are conducting tensile tests on metals at temperatures as low as minus 452°F, which is just short of absolute zero or minus 459.6°F at which theoretically all molecular motion ceases. Apparatus used is slightly larger than a hand fire extinguisher and contains a special vacuum insulated chamber in which the metal sample, ¼-in. in diam and 1 in. long, is placed. Liquid nitrogen, which is more economical and efficient as a refrigerant at temperatures down to minus 320°F, is employed for precooling. Then liquid helium is introduced to reduce the temperature in the chamber to minus 452°.

Size By-passed

UNIVERSAL spectrographic method for determining common constituents of iron and steel which is not dependent upon sample size has been reported by Picatinny Arsenal, and is described in a report designated PB 115587. Titled "Universal Spectrographic Method for Analysis of Iron and Steel," it describes details of the method for determination of Si, Mn, Ni, Cr, Co, Mo, Ti, Nb (Cb), V, and Al. Spectrographic conditions and experimental procedure are given and results shown in numerous tables and logarithmic graphs. Copies of the report may be obtained from the Office of Technical Services, Washington 25, for $3.75 in microfilm and $10.25 in photocopy.

Protective Surface

MODERN process which diffuses chromium into ferrous metals and forms a stainless surface 0.001 to 0.008-in. deep without causing dimensional changes is claimed by Alloy Surfaces Co., Philadelphia. Process provides corrosion resistance under severe conditions, thermal oxidation up to 1700°F and wear and abrasion resistance. It is said that the surface will not chip, crack, peel or gall even when the piece is bent 180°, stretched or twisted. Products can be welded before or after processing. Treatment can be applied to gray iron and malleable iron castings.

Withstands the Heat

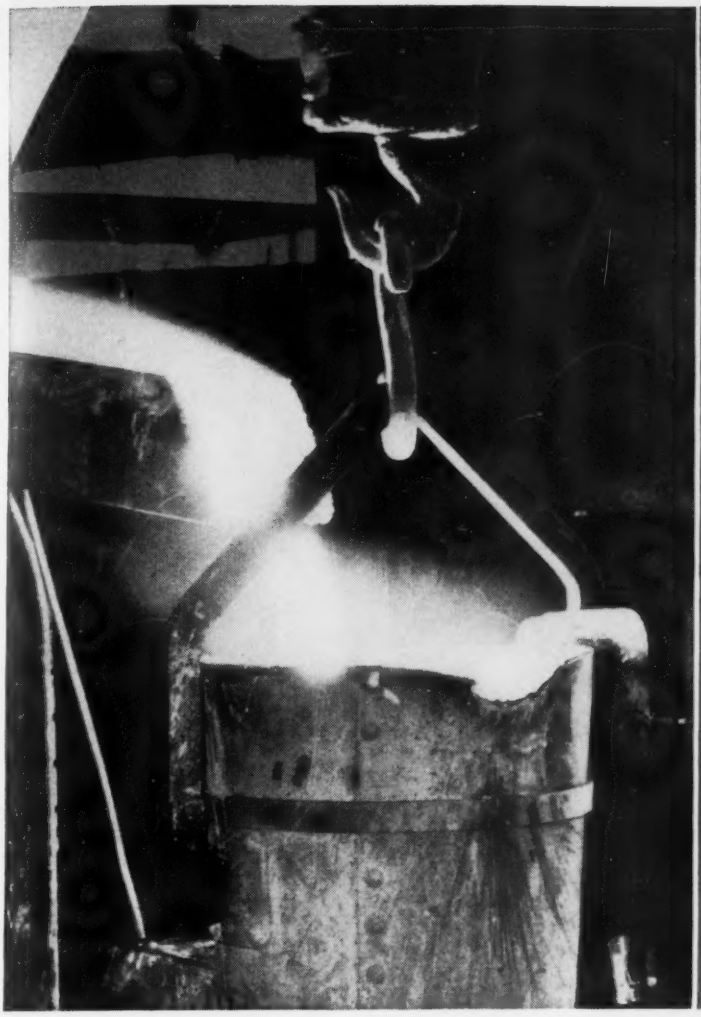
WEST COAST foundry reports highly satisfactory results in use of zircon sand in the shell mold production of stainless and other high-alloy steels. The sand provides a hard refractory surface which resists cutting or erosion, and burn-in or penetration. It is particularly effective where high pouring temperatures are required to pour thin sections.

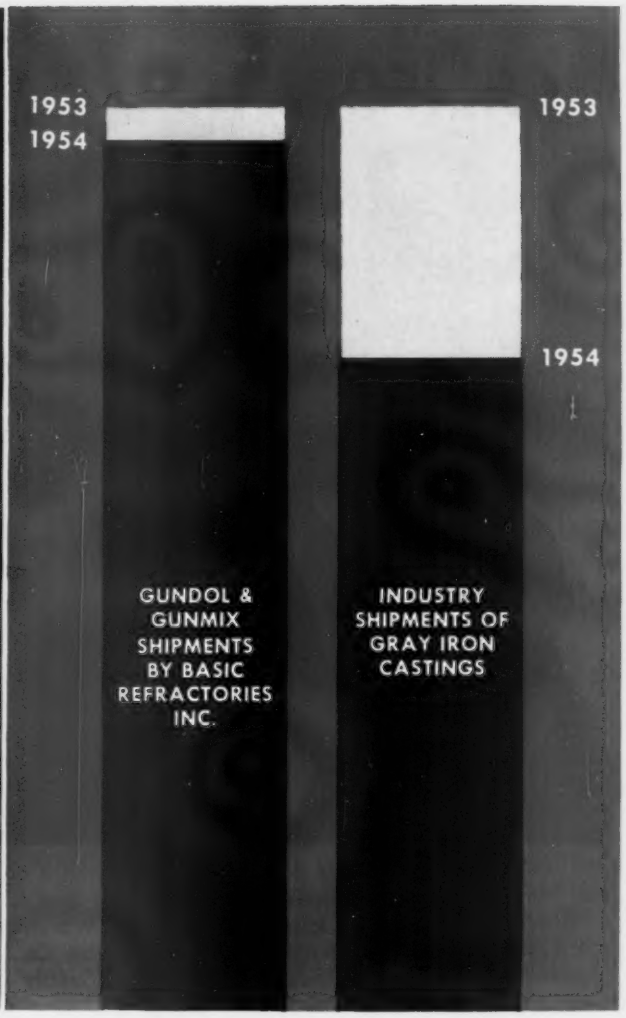
Combines Practices

COMBINATION of plaster and investment casting techniques employed by Howard Foundry Co. at its Milwaukee plant is claimed to provide excellent results in producing microwave "plumbing" used in radar and sonar applications. As-cast finishes ranging from 15 to 20 microinches with a maximum of 30 microinches are being obtained consistently as well as as-cast tolerances of plus or minus 0.0015-in., according to reports. Alloys used include beryllium copper and aluminum-base.

Measures Ozone

PHOTOELECTRIC instrument developed for automatic around-the-clock measurement of ozone, suspected as the major cause of smog in the Los Angeles atmosphere, recently has been placed in operation by the Air Pollution Foundation in that city. Three additional instruments will be installed later. Measurement of amount of ozone is based on its characteristic of absorbing ultraviolet rays. Instrument used is composed of a unit generating definite amounts of ultraviolet rays which are projected about 300 ft to a receiver which measures the quantity left after absorption by the ozone.





DEMAND FOR BASIC IRON HOLDS STEADY

SHIPMENTS of the maintenance refractories, Gundol and Gunmix to foundries operating basic cupolas in both years dropped less than 2 per cent in 1954 from the previous year. Shipments of gray iron castings were down almost 15 per cent compared with 1953. These facts suggest that demand for metal produced in basic-lined cupolas held steady despite a general market decline.

Although basic lining and repair materials initially cost more than acid, these costs are offset by the following advantages:

1. **Lower sulphur content in the iron produced**
2. **Greater carbon pickup**
3. **Steel scrap can be substituted for low-phosphorous pig iron without lowering the total carbon content of the iron produced**
4. **Lower cost metal charges can be used**
5. **Less scrap castings**
6. **Better pouring characteristics of metal**
7. **Absence of bridging and clean drop**
8. **Higher metal tap temperatures**

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CALIFORNIA FOUNDRYMEN

Hold Successful Conference

Shown at the Pasadena conference are some of the men who are active in affairs of the California AFS chapters. Left to right: John Bermingham, E. F. Houghton Co.; Clayton Russell, Phoenix Iron Works; George Emmett, Los Angeles Steel Casting Co.; Edwin Berger, Associated Metals Co.; C. R Tinsley, U. S. Pipe & Foundry Co., Jack Kaney, Industrial Foundry & Supply Co. and Jay Snyder, Joseph-Musto-Keenan Co.

By WILLIAM G. GUDE
Managing Editor

APPROXIMATELY 250 West coast foundrymen met in the attractive setting of the Huntington-Sheraton, Pasadena, Calif., Mar. 25-26, for a successful biennial California Regional Foundry Conference.

It was sponsored by the Northern and Southern California Chapters of the American Foundrymen's Society, with the latter acting as host chapter. William C. Baud, Mechanical Foundry Division, Food Machinery & Chemical Corp., Vernon, Calif. headed the general conference committee.

The conference got under way Friday noon with a luncheon presided over by Myron Niesley, California Testing Laboratories, Los Angeles. Charles R. Gregg, president of the Southern California Chapter, welcomed the visitors. Mr. Gregg, who is president of Gregg Iron Foundry, El Monte, Calif., stressed the value of discussion among foundrymen in the interest of improving operating practice. He also pointed out the need for the industry to improve its working conditions and to try to expand educational facilities at engineering schools where foundry subjects may be taught.

Herbert F. Scobie, editor, *American Foundrymen,* discussed briefly some of the activities of the national AFS organization, and outlined some of the technical features to be included in the program of the coming national convention in Houston, Tex.

Ten technical sessions, covering both ferrous and nonferrous subjects, were conducted during the two days. The first session on cast iron, under the chairmanship of E. G. Gaskell, Ace Foundry Ltd., Los Angeles, had Harry Kessler, manager of foundry operations, Sorbo-Mat Process Engineers, St. Louis, discussing "Improved Methods in Foundry Practice." Speaking of the carbon dioxide process for the treatment of molds and cores, Mr. Kessler said that it has been employed successfully in molds for making castings as large as 34 tons. It provided a mold hardness of 80.

The speaker recommended that foundrymen be consistent in their use of materials in melting practice. Changes in types of scrap used, for instance, will affect shrinkage characteristics of the metal. Liquid shrinkage increases with the strength of the iron, and mold hardness also is a factor in resulting shrinkage. He recommended these successive steps in correcting shrinkage: 1. Changing composition of the metal. 2. Use of risers. 3. Use of chills. 4. Design changes in the casting.

Factors influencing the quality of aluminum and copper base alloy castings were discussed by Donald L. LaVelle, assistant manager, aluminum department, Federated Metals Division, American Smelting & Refining Co., South Plainfield, N. J. C. J. Egetter, Crown Brass Mfg. Co., Los Angeles, was session chairman. Mr. LaVelle said that although melting practice is commonly looked to as the main influence on casting quality, bad gating practice probably is the chief offender. Red brass alloys generally are so easy to cast that sound gating practice frequently is not used. Proper gating is even more important for the higher shrinkage and more drossy alloys

such as aluminum and manganese bronze.

Aluminum is more sensitive than brass to improper gating since shrinkage is caused easily by hot spots resulting from poor distribution of the metal flowing into the mold cavity. Use of too few gates is a common fault. Bad pouring practice ranks with poor gating as a source of inferior quality castings. Mr. LaVelle said that the gating systems most commonly used in brass foundries have little effect on minimizing agitation. To raise casting quality, he recommended that more emphasis be given to the design of gating systems that improve metal flow and feeding efficiency.

A comprehensive review of recommended practice for the production of aluminum-alloy castings that will meet maximum quality standards was presented by Roy E. Payne, chief metallurgist, Aluminum Co. of America, Vernon, Calif. Fred E. Dye, Burndy Engineering Co. Inc., Lynwood, Calif. was session chairman.

Mr. Payne traced the production of the casting from preliminary discussions with the customer as to its end use, the casting process to be followed—sand, permanent mold or die—and the preparation and testing of sample castings before production is initiated. He suggested the preparation of standard practice cards to guide the procedure to be followed on subsequent production of the same parts. He then went on to describe recommended practice in melting, degassing, pouring, etc.

Considerable progress has been made in the scientific approach to the feeding of steel castings, it was pointed out by Malcolm MacGregor, metallurgist, General Metals Corp., Oakland, Calif. At this session, presided over by Arnold K. Steger, Hanford Foundry, San Bernadino, Calif., Mr. MacGregor discussed some of the work done which permits accurate placing of feeders of proper sizes on castings. He pointed out that while it is true these formulas are based originally on simple shapes, it is possible in many instances to treat castings of complicated shapes as composed of a number of simple units. This frequently can be accomplished by the use of chills and feeders then can be applied to the component parts.

Results of exhaustive tests on production of castings with reclaimed sand were described by William D. Emmett, general superintendent, Los Angeles Steel Casting Co., Los Angeles. This session was presided over by Hubert Chappie, National Supply Co., Torrance, Calif. The speaker's steel foundry employs dry screening of used sand with air separation of the fines. A hammer mill breaks up lumps. New sand is a five-screen type of 58 AFS grain size, and after reclamation averages 59 size, also of five screen. Sand losses are offset by addition from cores at the shakeout. The main problem in use of this reclaimed sand is erosion.

While some of the conclusions arrived at through various test castings poured in sand mixtures of various compositions and mulling time are regarded by the speaker as theoretical, it is thought apparent that the bentonite bonds hold the key to the problem. Bonding power of the bentonite is affected by high temperatures, losing its strength when heated near 1000°F. Additions of sodium carbonate to raise the Ph factor of the sand mixture proved to be the most important step in correcting erosion conditions.

A review of the principal aluminum casting alloys, their properties and applications was presented by John J. Stopie, Apex Melting & Refining Co., Long Beach, Calif., at a session presided over by Robert R. Haley, Advance Aluminum & Brass Co., Los Angeles. Mr. Stopie discussed these alloys according to the ASTM specifications, listing them by classes, physical properties and corrosion resistance. Slides were presented showing properties of the various alloys. He concluded his

Jonathan Marden (left), Eutectic Welding Alloys Corp., was dinner speaker at the conference. William C. Baud (center), Mechanical Foundries Div., Food Machinery & Chemical Corp., was general chairman and Otto H. Rosentreter (right), Otto H. Rosentreter Co., was technical section chairman

Famous foundry families at the California conference. Left to right: Robert Gregg, Reliance Regulator Div., American Meter Co., and his son, Charles Gregg, Gregg Iron Foundry; S. D. Russell, Phoenix Iron Works, and his son, Clayton Russell, same company; George Emmett and his brother, William D. Emmett, both with the Los Angeles Steel Casting Co. (All conference photos are by A. P. Griffith, General Refractories Co.)

discussion with a description of the high-zinc alloys, indicating the effect of zinc on corrosion resistance and physical properties.

Essentials required to make good castings were listed in a comprehensive discussion by William Ball Jr., R. Lavin & Sons, Cincinnati, at a bronze casting session which had Charles W. Ammen, Ammen Nonferrous Foundry, Los Angeles, as chairman. Mr. Ball said that of the three major essentials—men, machines and materials—men are most likely to be at fault in the production of inferior castings. He pointed out that consideration must be given to the type of alloy to be cast, the type of melting furnace employed and the volume of production required, since all of these factors have an effect on casting quality. In addition, the pattern must be right, the correct size of flask must be employed, sand and core mixtures must be properly selected and prepared, and gating and heading arrangement must be suited to the part being cast.

Mr. Ball illustrated a number of different castings to indicate the best way to gate in order to obtain sound metal. He emphasized the importance of sufficient venting, since gas is given off whether a mold is cored or not. Care should be exercised in the melting department to obtain the correct atmosphere, and he stressed the need for intelligent supervision in this important phase of the entire casting process. Selection of the proper pouring temperature was listed as a must, and the speaker illustrated how a foundry can develop tests to indicate the correct pouring temperature for each type casting so as to obtain best quality.

Some of the basic principles of sand control were discussed by Harold E. Henderson, sand technician, H. C. Macauley Foundry Co., Berkeley, Calif., at the concluding ferrous session. Robert Gregg, Reliance Regulator Division, Alhambra, Calif., was session chairman.

Mr. Henderson emphasized particularly the need for close control over moisture content and pointed out the importance of determining the best moisture content for each individual application. This is because different sands have different moisture requirements and the quality and quantity of clay used also is a determining factor. Likewise, variations in size and shape of castings produced and the pouring temperature of the metal will influence percentages of moisture as well as other materials employed in the sand mixture. Mr. Henderson said that much more study is required to explain mold deformation, although it appears that excess moisture is a principal contributing factor.

The concluding technical session was devoted to insulating and exothermic materials used on gates and risers of castings. Speaker was Michael Bock II, Exomet Inc., Conneaut, O., with Phil C. Rodger, General Metals Corp., Los Angeles as chairman. Mr. Bock prefaced his discussion by a description of the mechanism of metal solidification. He explained the use of such insulating materials as rice hulls, amorphous graphite, charcoal, mildly exothermic materials, metal - producing exothermic materials, and outside sources of heat such as a carbon arc to maintain temperature in the riser.

Retarding the solidification of a riser can produce effective feeding and influence the quality of the casting. If use of an insulated or exothermic material to the riser is intended only to reduce the amount of metal in the riser and raise the yield, economics of the application must be determined to ascertain if the saving is sufficient to offset the cost of the material employed.

B. G. Emmett, works manager, Los Angeles Steel Casting Co. and national regional vice president, AFS, presided at the dinner held Friday evening. This was followed by a technical session presided over by Charles F. Weissgerber, Alloy Steel & Metals Co., Los Angeles, at which the subject was "New Developments in Foundry Welding." Jonathan Marden, Eutectic Welding Alloys Corp., New York, discussed the use of welding in repairing castings and in joining castings and wrought parts in assembly. He also described the use of special rods for gouging purposes. His talk was followed by a motion picture which depicted use of the various types of rods.

Social activities of the conference were highlighted by receptions Friday and Saturday evenings. The hosts were the Columbia-Geneva Steel Division, U. S. Steel Corp. and the Kaiser Steel Corp., Fontana, Calif., respectively.

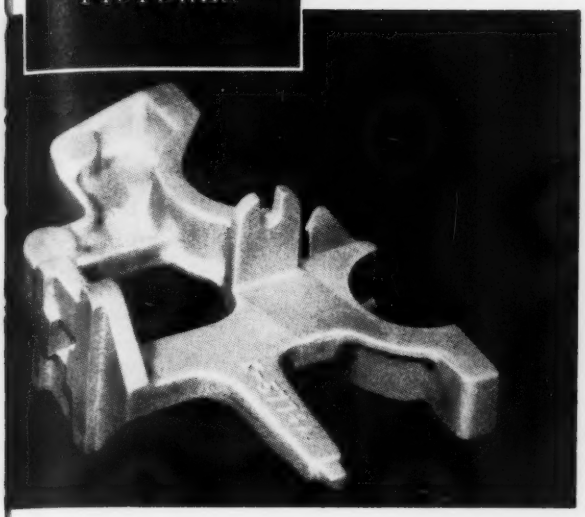
Western Metal Congress — California chapters of the AFS were among a number of technical societies sponsoring programs during the Western Metal Congress held at the Ambassador Hotel, Los Angeles, the week following the regional conference. The congress was held in conjunction with the Western Metal Ex-

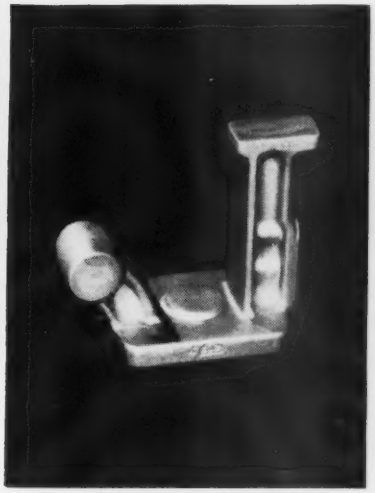
GANGWAY! BY J. A. PATTERSON

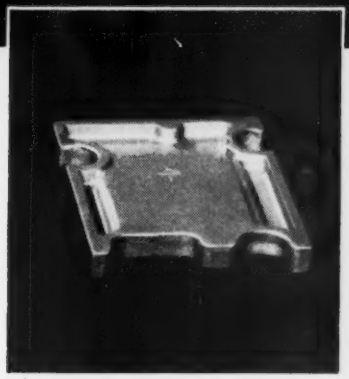
"Muskerwitch, I'm sure the boys were pulling your leg when they told you I wanted you and your big pot in my office!"

MONSANTO PROFIT PICTURES

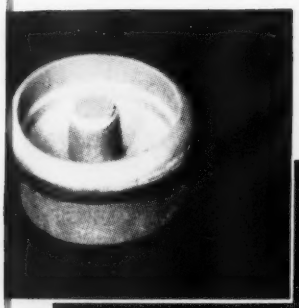
DO YOUR CASTINGS NEED COSTLY CLEAN-UP?

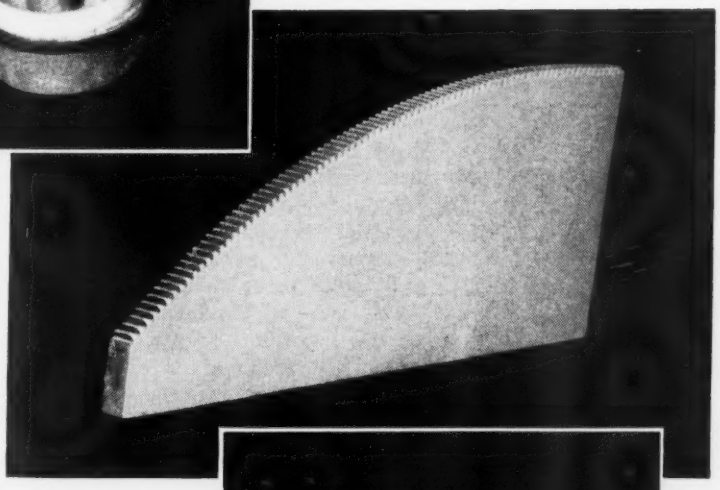






Get results like this... without finishing ...by using Resinox-bonded shell molds!





More and more foundries are discovering a way to make phenomenal savings in cleaning room costs.

By bonding shells with Monsanto's Resinox,* they are producing castings that have the highest order of surface finish.

On many jobs no finishing is required, even on intricate designs. Edges are clean and sharp—detail is perfect. Rejects are minimized.

Resinox phenolic resin sets up to form harder, stronger molds. Consistently close dimensional tolerance can be held—between 0.002 to 0.004 inches per inch for casting weights ranging from a few ounces to over 200 pounds!

On a low resin-to-sand ratio, Resinox saves valuable machine time and usually improves metal yields.

With the economy and quality of shell molding depending so much on the resin used, it pays to specify Resinox.

For shell molding, core binding or sand conditioning resins that are research-developed and shop-tested to meet *your* foundry needs, write first to Monsanto Chemical Company, Plastics Division, Springfield 2, Mass.

*RESINOX: REG. U. S. PAT. OFF.

For stronger shell molds, specify

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position conducted by the American Society for Metals at the same time.

The AFS session, held the evening of Mar. 28, included three papers on its program. S. L. Jackson, Electro-Metallurgical Co., division of Union Carbide & Carbon Corp., Los Angeles, was session chairman.

Morris Asimow, Enterprise Ductile Iron Foundry Inc., Los Angeles, discussed properties, production and applications of ductile iron. Chemical requirements for the formation of spheroidal graphite, he said, include low sulphur (0.04 per cent or less, preferably 0.02), low phosphorus and a minimum of tramp alloys. High tapping temperature—2900 to 2950°F—is desirable.

A carrier metal in combination with the magnesium addition is necessary to prevent volatilization of the latter. Retention of approximately 0.05 per cent magnesium is required in the iron to produce a completely spheroidal matrix. Dr. Asimow recommended use of large gates with risers similar in size to those used with steel castings. He also suggested employment of low-moisture, high-permeability sand.

Walter H. Dunn, vice president and general manager, Pacific Alloy Engineering Corp., San Diego, Calif., discussed the production of high-alloy and stainless steel castings in shell molds. This company uses a zirconium silicate sand. It has a melting point of more than 4000°F and conducts heat four times as fast as silica sand.

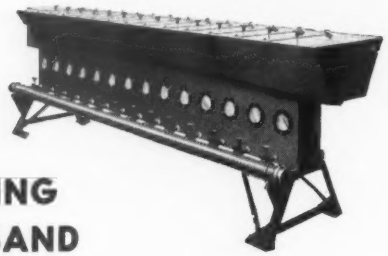
While admitting that the shell mold process has been oversold and that much is to be learned regarding it, Mr. Dunn said it has numerous advantages, such as: Cleanliness, minimum handling of materials, durable molds that can be stored for a long period, economical mechanization with unskilled labor, relatively low pouring temperature of metal, regulation of mold collapsibility, hard mold surface that reduces sand washing and mold sag. High initial cost of patterns and of many castings as cast are among its disadvantages. As an indication of progress in development of the process, the speaker pointed to production of shell molded parts today which his company would not have considered quoting on a year and a half ago.

In discussing the investment casting process, James B. Price Jr., manager of sales engineering, Arwood Precision Casting Corp., Los Angeles, said that it is being used to cast parts principally in these metals: Aluminum, magnesium, copper-base alloys, low-alloy steel, stainless steel and high-alloy steel. Maximum limits on size have not yet been determined but 20 to 22 pounds now is about the top on production runs.

Investment casting cannot compete with die casting on certain jobs made of the low-melting-point alloys, according to Mr. Price, but shows to particular advantage with the hard-to-machine alloys.

Founders To Meet in Belgium

Three days of foundry meetings are being organized by the Association Technique de Fonderie de Belgique for the Liege Fair, Liege, Belgium, May 5, 6 and 7. Thirteen papers are to be presented. The theme for the first day is to be "Control of Manufacture" and "Relations Between the Foundry and Its Customers." The topic for the second day will be "The Foundry and Scientific Research." On the third day Prof. P. Bastien will present "The Study of Gases in Steel Castings." The closing speech will be by A. De Sy, professor of General Metallurgy and Metallography at the University of Ghent.



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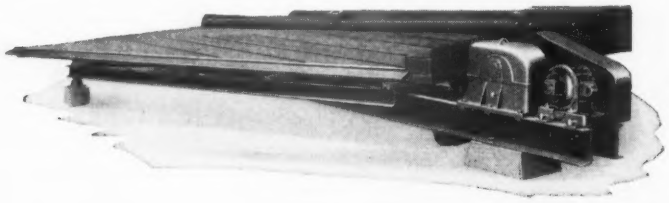
The CONCENCO® CPC Hydraulic Classifier is unexcelled for cleaning and sizing foundry sand. Operating by hydraulic water power only, it removes extremely fine and burned materials as a slime overflow while, at the same time, classifying the desirable sand grains so that the different sizes may be recombined to produce a completely satisfactory foundry sand. There are no moving parts, and separations are unusually sharp. Send for complete information.



For RECLAIMING WASTES from RESIDUES

The SuperDuty DIAGONAL DECK® Concentrating Table profitably reclaims values from foundry residues, particularly those non-ferrous metallics found in foundry and machine shop wastes and sweepings. Operation is simple and economical. Send for Bulletin 118-B.

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For the want of a spear . . .

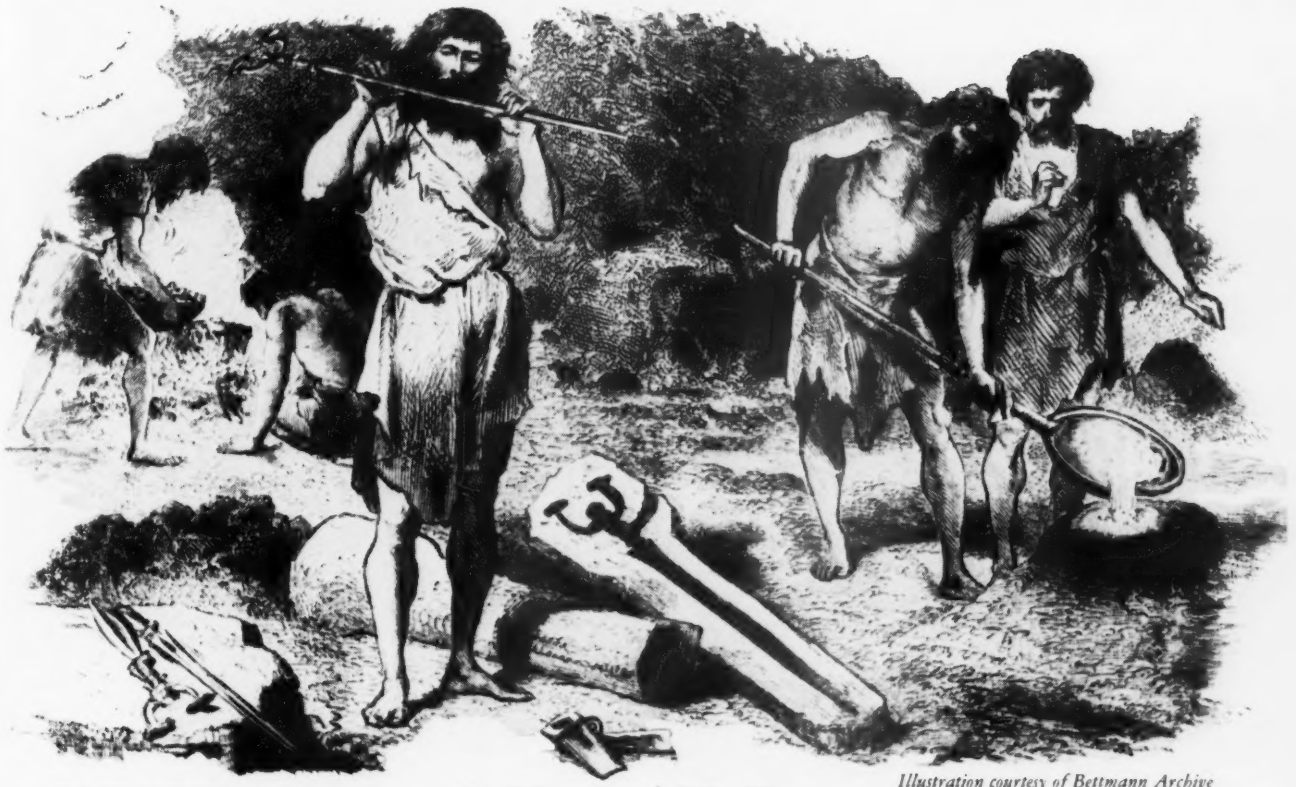

Illustration courtesy of Bettmann Archive

FIRE CLAY came into being!

One of the earliest uses of fire clay was for molds used in the manufacture of weapons for self defense. And so down through the ages man has depended more and more upon this essential material for many basic needs of civilization.

Today, fire clay that resists high temperatures marks the beginning of countless products. *Without* it, most industrial furnaces could not melt their metal. *With* it, metallurgy has constantly progressed. Furnace temperatures go higher and higher . . . and fire clay refractories keep pace to withstand the higher heat.

Illinois Clay Products Company manufactures many types of refractories and supplies leading steel plants and foundries. Located near the "heart" of midwestern industry, the extensive Goose Lake fire clay deposits and modern processing facilities assure highest quality refractories—with fast, dependable shipments.

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Manufacturers of Goose Lake Fire Clay, Chem-Brix Refractories and Therm-O-Flake Insulation

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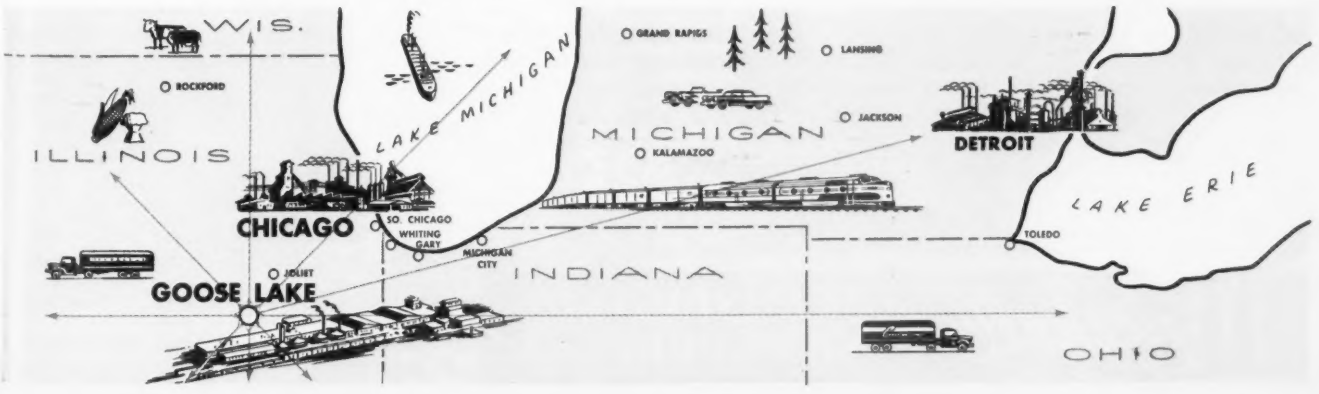
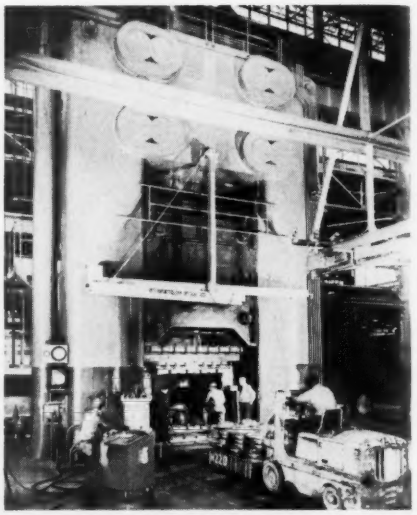


Huge Castings are Feature Of Large Forging Press

A huge forging press of unique design, weighing 3,900,000 lb and capable of applying 8000 tons pressure, recently began production at the Cleveland works of Aluminum Co. of America. The press is 55 ft high with 38 ft above floor level. Die area is 4½ x 11½ ft. It will make large precision aircraft forgings for the Air Force as well as nonmilitary automobile and truck wheels.

Most hydraulic presses are held together by threaded tie rods which act like giant bolts to prevent the press from pushing itself apart as pressure is applied to its dies. This press, designed and built by United Engineering & Foundry Co., is constructed as though it were one rigid casting.

Actually it is composed of a number of giant castings joined to act as one. The large castings (seven of them weigh over 400,000 lb each) are held together by shrink links. Rings are heated and fit over lugs on each of the big castings. As they cool and contract over the lugs they hold the castings firmly together. This one-casting-rigidity permits accurate guiding of dies and allows close tolerance work.



The press has a working stroke of 6 ft with a 3-in.-per-second pressing speed. Hydraulic pressure is supplied by three 700-hp pumps and stored in a 600-gal accumulator at 4500 psi.

CHECK All 3—

—Avoid Underheating, Overheating of Metals

Use Marshall Enclosed-Tip Thermocouples to measure the temperature of all three of your molten metals—brass, aluminum or magnesium—and thus make certain your melts are poured at just the right heat! Marshall Thermocouples report metal temperatures quickly and dependably. They aid in eliminating casting flaws, and sound, strong, dense castings result.

The use of Marshall Thermocouples also speeds casting operations and lowers production costs. They eliminate the misruns, cold shuts, sponginess, and excessive shrinkage caused by underheating or overheating the metals. Rejects are minimized and the scrap pile diminishes. Write for descriptive literature.

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270 W. Lane Ave. Columbus 2, Ohio

Marshall ENCLOSED-TIP THERMOCOUPLES

Casting Production Increases In United Kingdom in 1954

Iron casting output in the United Kingdom in 1954 was 3,742,000 tons, 2.9 per cent more than in 1953 and almost as high as the record productions in 1951 and 1952. In addition, considerable expansion during the last quarter of the year points to the possibility of record output during 1955.

Production of automotive castings did reach record tonnage, a total of 316,000 tons, or 16½ per cent more than in 1953. Agricultural implement and machinery castings hit 183,000 tons, 27½ per cent more than in 1953. The following table shows the tonnage output of gray iron and malleable castings in 1954 for each of the six main sections of the iron founding industry in the United Kingdom:

	1953	1954	% Change
Automotive (excluding tractors)	271,000	316,000	+ 16.5
Pressure pipes and malleable tube fittings	683,000	711,000	+ 4.0
Engineering and jobbing	1,432,000	1,486,000	+ 3.8
Building and domestic	549,000	566,000	+ 3.3
Railway equipment	329,000	311,000	— 5.3
Ingot molds	374,000	352,000	— 6.0

The iron foundry labor force increased from 141,220 to 142,751 persons during 1954.

SLINGER ROTO-MOLD AND HYDRA-SLINGER ROTO-MOLD UNITS give the jobbing foundry all of the advantages of production operation . . . with top flexibility and at a cost well below that of other installations offering similar productivity. Inherently low man-hour requirement offers the jobbing foundry great advantage.

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PREVIEW OF

1956 FOUNDRY MACHINERY

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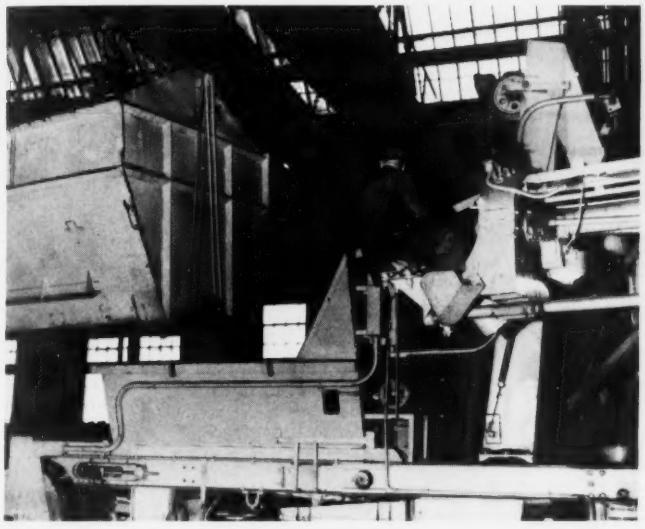
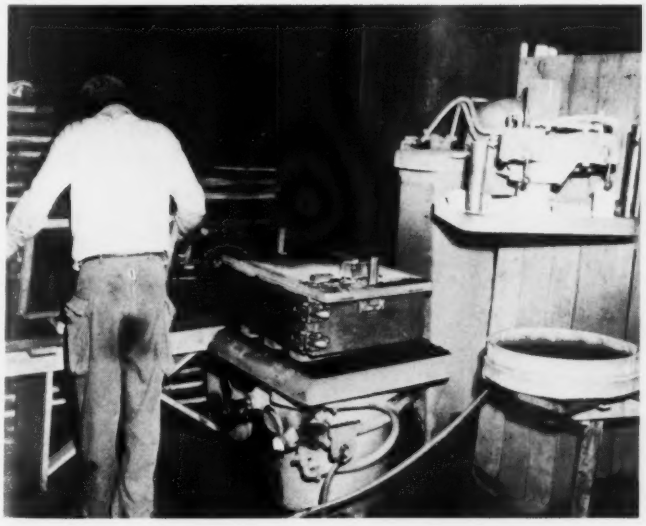
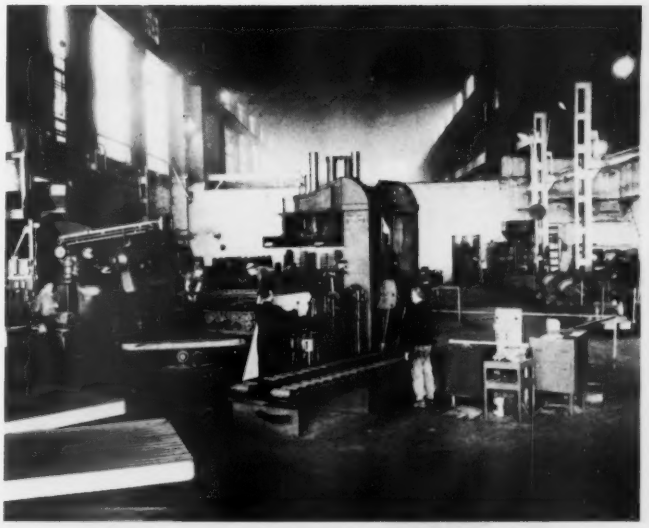


RECENT IMPROVEMENTS make the Motive Slingers–the Motive Sandslinger and Speedslinger—the best possible investments for foundries ramming a wide range of medium and large work. Recent improvements give the "motives" even greater advantage in jobbing operations. Range of size and operation is unlimited.

...IN MOLDING MACHINERY



THE NEW B&P JOLT SQUEEZER with 6-inch jolt cylinder and 16-inch squeeze cylinder is of swinghead design. Dual safety squeeze controls and knee valve jolt control make this machine extremely fast and safe. Table size is 20 x 26 inches, and the vertical opening between table and squeeze head is 20 inches. The capacity of this fast new squeezer is 940 lbs.



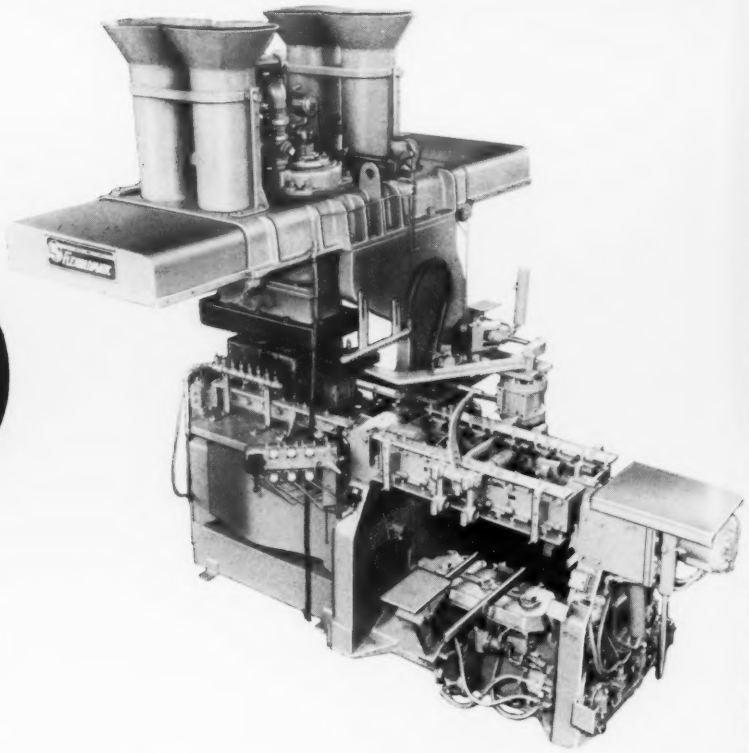
THE NEW B&P ROL-A-DRAW offering capacities to 10,000 lbs. is for use in coremaking or molding units with Slinger, Roto-Mold, or conveyor installations. It features automatic flask equalization and clamping, automatic single control, rollover cycle, all-hydraulic controls and minimum pit requirement. Flasks or core boxes up to 60" width—76" depth and length unlimited.

Each year look to

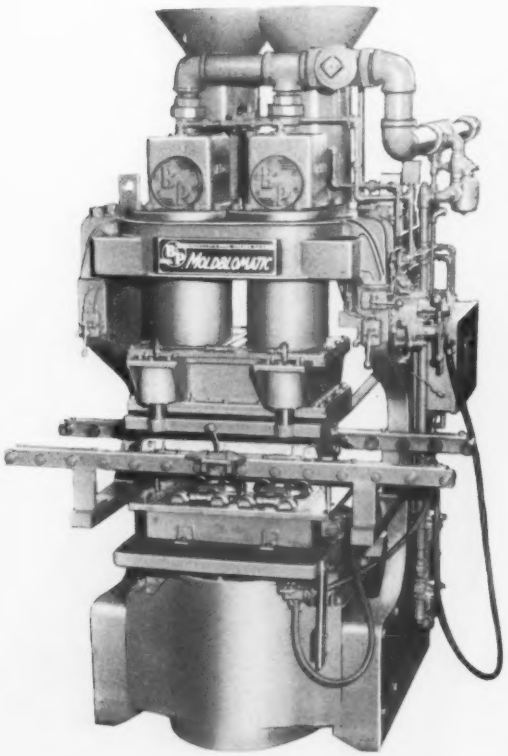
BEARDSLEY & PIPER

for better methods

. . . IN MOLD AND CORE BLOWERS



THE B&P FLEXIBLOMATIC coreblower is all new, all-pneumatic, and all-automatic. It's simple to operate and easy to service since there are no troublesome electrical contacts or relays. So efficient is the new Flexiblomatic, that this new unit blows, rolls over, and draws **240 cores per hour.** Indexing of the box, blowing, rollover, drawing, ejection, and delivery of the core are all automatic.



THE NEW B&P MOLDBLOMATIC blows and squeezes copes or drags in a single fully controlled cycle. More than ever before, the name Beardsley & Piper means leadership in the mold and core blowing field. Uniformity, accuracy and speed are characteristics of this new process. Capacity . . . up to two complete molds per minute. Flask size . . . up to 18 x 26 inches.

THE NEW FLEXIBLO CB5-CD COREBLOWER leads the field in small coreblowers. Its precision 2" draw is an invaluable feature for the core room. New also is the error-proof single push-button sequence control. One small button controls every operation in the blowing sequence. Look for new standards of performance from this B&P Flexiblo. Capacity—cores up to 4½ lbs. in weight.

. . . IN MOLDING AND CORE SAND PREPARATION MACHINERY

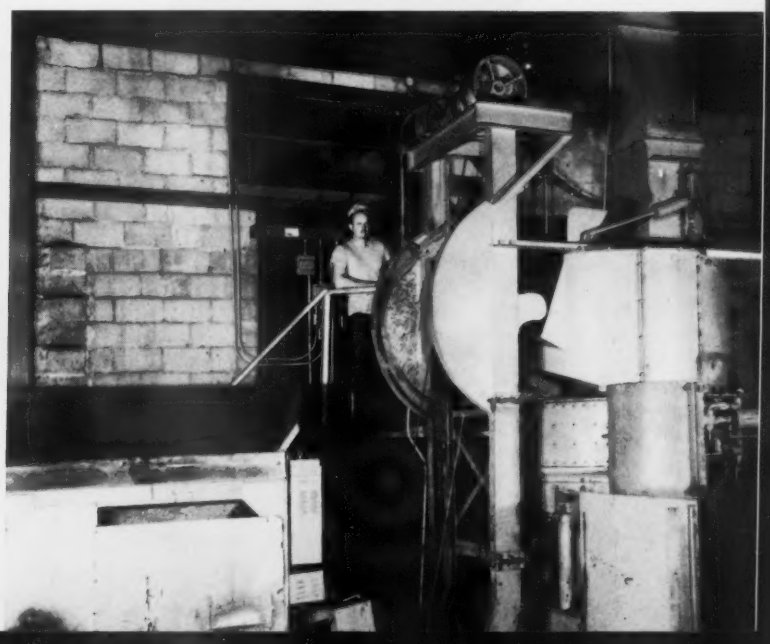
EVERY FLOOR SAND CONDITIONING REQUIREMENT is met by one of B&P's complete line of floor sand conditioning machines. The Junior Nite Gang shown here features complete lump breaking, magnetic separation, aeration, and screening. The same high standard of sand conditioning is featured in the self-propelling and self-loading Nite Gang. Capacities to 40 tons per hour.

CONTROL OF MULLING OPERATIONS becomes more and more vital as labor and material costs rise. For Mulbaros and Speedmullors, Mulltrol—which controls the overall mulling cycle is the minimum recommended control. For all of those foundries which must obtain fullest uniformity and control, Mulltrolmatic offers the ultimate in automatic operation.

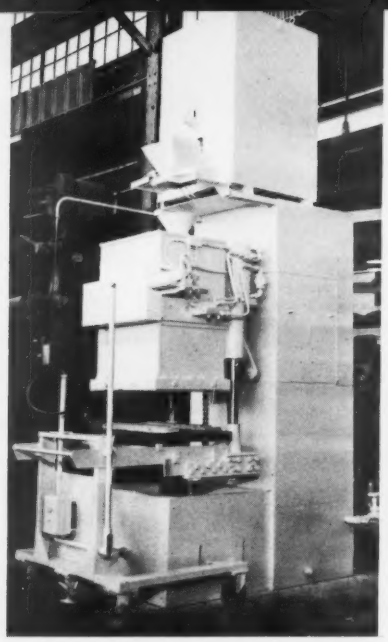
FOR LOW COST CONDITIONING the three models of Screenarator —S, M and L—just can't be duplicated. Recent improvements have lengthened service life and reduced maintenance. Capacities of 750, 1000, and 1500 lbs. per minute. The lowest cost and easiest to operate complete screening and aerating device that can be installed.

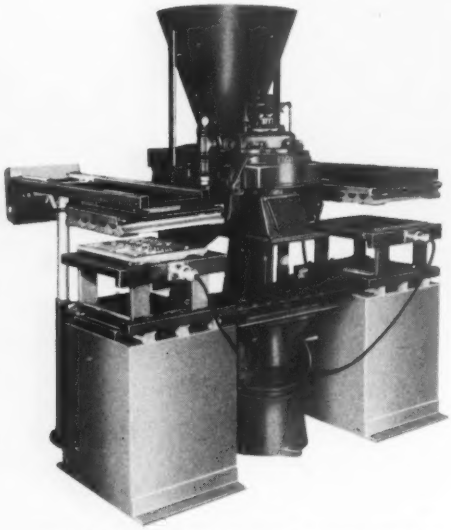
THE MULBARO AND LAB MULBARO offer the same high standard of mulling as the production Speedmullors. The Mulbaro gains highest capacity of any portable mullor by using a single mulling mechanism with several mulling bowls. Capacity is doubled or tripled at little added cost. The Lab Mulbaro also features interchangeable mulling bowls for best laboratory control.

THE NEW "A" SERIES SPEEDMULLORS have important new advantages that extend their margin of performance superiority. Hourly outputs of completely mulled sands are **increased 20 to 33%** in every model. Speedmullor-Preparator Units with the new **all above-floor Preparators** offer the jobbing foundry convenience, control, and quality never before available.



. . . IN SHELL MOLDING





B&P UNIT-PACKAGE DESIGN means real savings for the foundry entering the shell molding field. Now, the progressive foundry can start—at minimum investment—with those units that are essential to its early program . . . investment unit or blower, furnace, and draw station. Later, these same packages can be combined at a small additional investment into a complete Rotary Formatic Unit.

SHELL BLOWING too, with the new B&P Blomatic Shell machine, can be included in a foundry's plans at minimum cost. Proved shell blower and shell curing furnace design are combined in the new Shell Blomatic. A Blomatic Shell machine may be used individually or made a part of a complete rotary unit.

SHELL SAND PREPARATION is accomplished at minimum initial and operational cost in the new Shell Mulbaro. Designed to provide the exact cold preparation needed for either the "C" or "D" processes, the Shell Mulbaro is ideal for the small foundry. For higher capacity requirements for either hot or cold preparation, the Shell **Speedmullor** is manufactured in sizes to meet any requirement, and is the only mulling unit that offers efficient preparation of shell sands by the hot process. The standard **Speedmullor** is used extensively for high capacity cold preparation of shell sands.

Manufacturers of Sandslingers, Speedslingers, Hydra-Slingers, Swingslingers, Speedmullors, Speedmullor-Preparator Units, Mulbaros, Lab Mulbaros, Roto-Mold Turntables, Roto-Feed Plate Feeders, Screenarators, Magnarators, Junior Nite Gangs, Nite Gangs, Portable Preparators, Flexiblo and Flexiblo-matic Coreblowers and Moldblowers, CR and TR Cormatic Units, B&P Rol-A-Draw, and Jolt Rol-A-Draw Machines. Shell Mulbaros, Shell Speedmullors, Formatic and Blomatic Shell Molding Units, Champion Molding Machines, J&J Molding Machines and a complete line of automatic control equipment including Blomatic, Mulltrol and Mulltrolmatic.

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Speed Calculation of Board Feet in Pattern Lumber

The accompanying tables, which give the number of board-feet in planks of various sizes, will be found of value to patternmakers and others in calculating the cost of lumber for patterns and flasks. The size of the pieces is given at the left and their length in the various columns across the top of the table.

A board foot contains 144 cubic inches of lumber. That is, a plank 12 inches square and 1 inch thick contains 1 board foot; if it were 2 inches thick, it would contain 2 board feet. However, in selling lumber, dealers always figure boards less than 1 inch thick as if they were inch boards.

The eight tables published cover a complete range of sizes of lumber ordinarily used in making wood patterns. Table I covers boards 1 inch thick, ranging from 1 to 12 inches in width and from 4 to 16 feet in length, the widths advancing by single inches and the lengths by feet. Table II covers boards 1¼ inches thick, also ranging in width and length from 1 to 12 inches and from 4 to 16 feet. In a similar manner, the subsequent tables cover 1½-inch, 2 inch, 2½-inch, 3-inch, 3½-inch and 4-inch planks.

The number of board feet in planks of odd length, not given in the table, may be found by simple interpolation. For instance, to find the board feet

TABLE I

Length in Feet

Feet Board Measure

Size	4	5	6	7	8	9	10	11	12	13	14	15	16
1 x 1	0.33	0.41	0.5	0.58	0.66	0.75	0.83	0.91	1.00	1.08	1.16	1.25	1.33
1 x 2	0.66	0.82	1.0	1.16	1.32	1.50	1.66	1.82	2.00	2.16	2.32	2.50	2.66
1 x 3	1.00	1.25	1.5	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00
1 x 4	1.33	1.66	2.0	2.33	2.66	3.00	3.33	3.66	4.00	4.33	4.66	5.00	5.53
1 x 5	1.66	2.08	2.5	2.91	3.33	3.75	4.16	4.58	5.00	5.41	5.83	6.25	6.66
1 x 6	2.00	2.50	3.0	3.50	4.00	4.50	5.00	5.50	6.00	6.60	7.00	7.50	8.00
1 x 7	2.33	2.91	3.5	4.08	4.66	5 25	5.81	6.37	7.00	7.57	8.16	8.75	9.33
1 x 8	2.66	3.33	4.0	4.66	5.33	6.00	6.66	7.33	8.00	8.66	9.33	10.00	10.66
1 x 9	3.00	3.75	4.5	5.25	6.00	6.75	7.50	8.25	9.00	9.75	10.50	11.25	12.00
1 x 10	3.33	4.16	5.0	5.33	6.66	7.50	8.13	9.16	10.00	10.82	11.66	12.50	13.33
1 x 11	3.66	4.58	5.5	6.11	7.33	8 25	9.16	10.08	11.00	11.90	12.82	13.75	14.66
1 x 12	4.00	5.00	6.0	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00

TABLE II

Length in Feet

Feet Board Measure

Size	4	5	6	7	8	9	10	11	12	13	14	15	16
1¼ x 1	0.41	0.52	0 62	0.73	0.83	0.93	1.04	1.14	1.25	1.35	1.45	1.56	1.66
1¼ x 2	0.83	1.04	1.25	1.45	1.66	1.87	2.08	2.28	2.50	2.70	2.91	3.12	3.33
1¼ x 3	1.24	1.56	1.87	2.18	2.50	2 81	3.12	3.43	3.75	4.05	4.37	4.68	5.00
1¼ x 4	1.66	2.08	2.50	2.91	3.32	3.75	4.16	4.57	5.00	5.41	5.82	6.25	6.66
1¼ x 5	2.08	2.60	3.12	3.64	4.16	4.63	5.20	5.72	6.25	6.76	7.28	7.81	8.32
1¼ x 6	2.50	3.12	3.75	4.37	5.00	5.62	6.25	6.87	7.50	8.10	8.75	9.37	10.00
1¼ x 7	2.91	3.64	4.38	5.10	5.83	6 56	7.29	8.01	8.75	9.47	10.20	10.93	11.66
1¼ x 8	3.32	4.16	5.00	5.82	6.65	7.50	8.32	9.15	10.00	10.82	11.66	12.50	13.32
1¼ x 9	3.75	4.66	5 62	6.56	7.50	8.43	9.37	10.29	11.25	12.18	13.12	14.05	15.00
1¼ x 10	4.16	5.20	6.25	7.27	8.33	9.57	10.30	11.54	12.50	13.52	14.55	15.62	16.64
1¼ x 11	4.58	5.72	6.87	8.01	9.17	10 31	11.45	12.60	13.75	14.88	16.03	17.18	18.35
1¼ x 12	5.00	6.25	7.50	8.75	10.00	11.25	12.50	12.75	15.00	16.25	17.50	18.75	20.00

TABLE III

Length in Feet

Feet Board Measure

Size	4	5	6	7	8	9	10	11	12	13	14	15	16
1½ x 1	0.5	0.61	0 75	0.87	1.0	1.12	1.33	1.36	1.5	1.62	1.74	1.87	2.0
1½ x 2	1.0	1.23	1.50	1.74	2.0	2.25	2.46	2.73	3.0	3.24	3.48	3.75	4.0
1½ x 3	1.5	1.84	2.25	2.61	3.0	3 37	3.75	4.13	4.5	4.86	4.72	5.62	6.0
1½ x 4	2.0	2.49	3.00	3.49	4.0	4.50	4.99	5.49	6.0	6.49	6.99	7.50	8.0
1½ x 5	2.5	3.09	3.75	4.36	5.0	5.62	6.18	6.75	7.5	8.11	8.73	9.37	10.0
1½ x 6	3.0	3.75	4.50	5.25	6.0	6.75	7.50	8.25	9.0	9.75	10.50	11.25	12.0
1½ x 7	3.5	4.36	5.25	6.12	7.0	7 87	8.72	9.61	10.5	11.35	12.24	13.12	14.0
1½ x 8	4.0	5.00	6.00	7.00	8.0	9.00	10.00	11.00	12.0	13.00	14.00	15.00	16.0
1½ x 9	4.5	5.43	6 75	7.87	9.0	10.12	11.25	12.37	13.5	14.62	15.74	16.87	18.0
1½ x 10	5.0	6.24	7.50	8.73	10.0	11.25	12.49	13.74	15.0	16.23	17.49	18.75	20.0
1½ x 11	5.5	6.87	8.25	9.61	11.0	12 37	13.74	15.12	16.5	17.85	19.23	20.62	22.0
1½ x 12	6.0	7.50	9.00	10.50	12.0	13.50	15.00	16.50	18.0	19.50	21.00	22.50	24.0

TABLE IV

Length in Feet

Feet Board Measure

Size	4	5	6	7	8	9	10	11	12	13	14	15	16
2 x 1	0.66	0.32	1 0	1.16	1.32	1.50	1.66	1.82	2.0	2.16	2.32	2.5	2.66
2 x 2	1.33	1.64	2.0	2.33	2.64	3.00	3.33	3.64	4.0	4.33	4.64	5.0	5.33
2 x 3	2.00	2.50	3.0	3.50	4.00	4 50	5.00	5.50	6.0	6.50	7.00	7.5	8.00
2 x 4	2.66	3.33	4.0	4.66	5.33	6.00	6.66	7.33	8.0	8.66	9.33	10.0	10.66
2 x 5	3.33	4.16	5.0	5.82	6.66	7.50	8.33	9.16	10.0	10.82	11.66	12.5	13.33
2 x 6	4.00	5.00	6.0	7.00	8.00	9.00	10.00	11.00	12.0	13.00	14.00	15.0	16.00
2 x 7	4.66	5.82	7.0	8.16	9.33	10 50	11.62	12.74	14.0	15.14	16.33	17.5	18.66
2 x 8	5.33	6.66	8.0	9.33	10.66	12.00	13.33	14.66	16.0	17.33	18.66	20.0	21.33
2 x 9	6.00	7.50	9 0	10.50	12.00	13.50	15.00	16.50	18.0	19.50	21.00	22.5	24.00
2 x 10	6.66	8.33	10.0	11.66	13.33	15.00	16.66	18.33	20.0	21.64	23.33	25.0	26.66
2 x 11	7.33	9.16	11.0	12.82	14.66	16 50	18.33	20.16	22.0	23.80	25.64	27.5	29.33
2 x 12	8.00	10.00	12.0	14.00	16.00	18.00	20.00	22.00	24.0	26.00	28.00	30.0	32.00

Speed Calculation of Board Feet in Pattern Lumber

in a plank 1½ inches thick, 5 inches wide and 10 feet 3 inches long, we first turn to the 1½-inch table. (Table III). On the line opposite 1½ x 5, under 10 feet, we find 6.18 board feet and under 11 feet, 6.75 board feet. The difference is 0.57 board feet. Now 10 feet 3 inches is equivalent to 10¼ feet. Therefore, divide 0.57 by 4 and add the product, 0.142, to 6.18, giving 6.322 board feet in a plank 1½ x 5 x 10¼.

If neither the width nor the length is given exactly in the table, a double interpolation is necessary; and if extreme accuracy is desired, a triple interpolation may be required if the exact thickness is not in the table.

The tables should be used with judgment. That is, do not take the trouble to make a lengthy interpolation, when the accuracy of the final result, in money, would not be changed over one cent. In most cases sufficient accuracy is attained by taking the nearest even dimensions given in the table without further calculation.

TABLE V

Length in Feet

Feet Board Measure

Size	4	5	6	7	8	9	10	11	12	13	14	15	16
2½ x 1	0.82	1.08	1.25	1.50	1.66	1.88	2.08	2.25	2.5	2.75	2.88	3.16	3.33
2½ x 2	1.66	2.03	2.50	2.88	3.33	3.75	4.16	4.56	5.0	5.40	5.80	6.25	6.66
2½ x 3	2.50	3.25	3.75	4.38	5.00	5.63	6.25	6.88	7.5	8.25	8.75	9.38	10.00
2½ x 4	3.33	4.16	5.00	5.80	7.50	8.00	8.33	9.16	10.0	10.80	11.66	12.50	13.33
2½ x 5	4.08	5.25	6.25	7.33	8.33	9.40	10.40	11.50	12.5	13.56	14.56	15.66	16.66
2½ x 6	5.00	6.25	7.50	8.75	10.00	11.25	12.50	13.75	15.0	16.25	17.50	18.75	20.00
2½ x 7	5.80	7.33	8.75	10.16	11.66	13.16	15.00	16.28	17.5	18.75	20.40	21.88	23.33
2½ x 8	6.66	8.33	10.00	11.66	13.33	15.00	16.66	18.33	20.0	21.66	23.33	25.00	26.66
2½ x 9	7.50	9.40	11.25	13.16	15.00	16.88	18.75	20.66	22.5	24.33	26.25	28.08	30.00
2½ x 10	8.33	10.40	12.50	14.56	16.66	18.75	20.80	23.08	25.0	27.08	29.16	31.25	33.33
2½ x 11	9 16	11.50	13.75	16.08	18.33	20.66	23.00	25.25	27.5	29.82	32.16	34.50	36.66
2½ x 12	10.00	12.50	15.00	17.50	20.00	22.50	25.00	27.50	30.0	32.50	35.00	37.50	40.00

TABLE VI

Length in Feet

Feet Board Measure

Size	4	5	6	7	8	9	10	11	12	13	14	15	16
3 x 1	1.0	1.25	1.5	1.75	2.0	2.25	2.5	2.75	3.0	3.25	3.5	3.75	4.0
3 x 2	2.0	2.50	3.0	3.50	4.0	4.50	5.0	5.50	6.0	6.50	7.0	7.50	8.0
3 x 3	3.0	3.75	4.5	5.25	6.0	6.75	7.5	8.25	9.0	9.75	10.5	11.25	12.0
3 x 4	4.0	5.00	6.0	7.00	8.0	9.00	10.0	11.00	12.0	13.00	14.0	15.00	16.0
3 x 5	5.0	6.25	7.5	8.75	10.0	11.25	12.5	13.75	15.0	16.25	17.5	18.75	20.0
3 x 6	6.0	7.50	9.0	10.50	12.0	13.50	15.0	16.50	18.0	19.50	21.0	22.50	24.0
3 x 7	7.0	8.75	10.5	12.25	14.0	15.75	17.5	19.25	21.0	22.75	24.5	26.25	28.0
3 x 8	8.0	10.00	12.0	14.00	16.0	18.00	20.0	22.00	24.0	26.00	28.0	30.00	32.0
3 x 9	9.0	11.25	13.5	15.75	18.0	20.25	22.5	24.75	27.0	29.25	31.5	33.25	36.0
3 x 10	10.0	12.50	15.0	17.50	20.0	22.50	25.0	27.50	30.0	32.50	35.0	37.50	40.0
3 x 11	11.0	13.75	16.5	20.25	22.0	24.75	27.5	30.25	33.0	35.75	38.5	41.25	44.0
3 x 12	12.0	15.00	18.0	21.00	24.0	27.00	30.0	33.00	36.0	39.00	42.0	45.00	48.0

TABLE VII

Length in Feet

Feet Board Measure

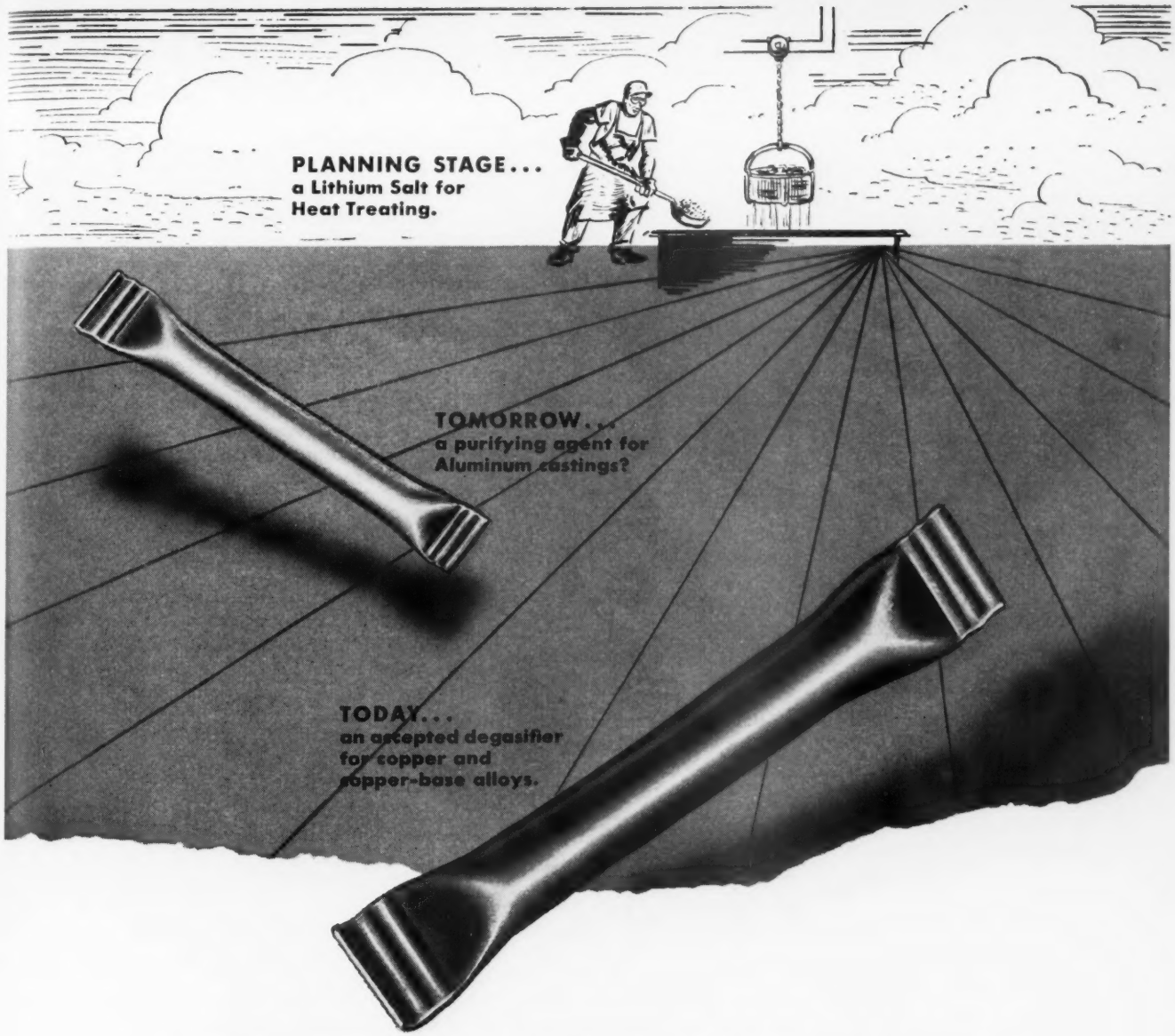
Size	4	5	6	7	8	9	10	11	12	13	14	15	16
3½ x 1	1.17	1.46	1.75	2.04	2.33	2.63	2.92	3.21	3.50	3.79	4.08	4.37	4.66
3½ x 2	2.33	2.92	3.50	4.08	4.66	5.25	5.83	6.41	7.00	7.58	8.16	8.75	9.33
3½ x 3	3.50	4.37	5.25	6.12	7.00	7.87	8.75	9.62	10.50	11.37	12.25	13.12	14.00
3½ x 4	4.66	5.83	7.00	8.16	9.33	10.50	11.66	12.83	13.99	15.16	16.33	17.49	18.66
3½ x 5	5.83	7.29	8.75	10.20	11.66	13.12	14.58	16.04	17.49	18.95	20.41	21.87	23.32
3½ x 6	7.00	8.75	10.50	12.25	13.99	15.74	17.49	19.24	20.99	22.74	24.49	26.24	27.99
3½ x 7	8.16	10.20	12.25	14.29	16.33	18.37	20.41	22.45	24.49	26.53	28.57	30.61	32.65
3½ x 8	9.33	11.66	13.99	16.33	18.66	20.99	23.32	25.66	28.00	30.32	32.65	34.99	37.32
3½ x 9	10.50	13.12	15.95	18.37	20.99	23.62	26.24	28.86	31.49	34.11	36.74	39.36	41.98
3½ x 10	11.66	14.58	17.49	20.41	23.32	26.24	29.16	32.07	34.99	37.90	40.82	43.73	46.65
3½ x 11	12.83	16.04	19.23	22.45	25.66	28.86	32.07	35.28	38.48	41.69	44.90	48.11	51.31
3½ x 12	13.99	17.49	20.99	22.49	27.99	31.49	34.99	38.48	41.98	45.49	48.98	52.48	55.98

TABLE VIII

Length in Feet

Feet Board Measure

Size	4	5	6	7	8	9	10	11	12	13	14	15	16
4 x 1	1.33	1.66	2.0	2.33	2.66	3.0	3.33	3.66	4.0	4.33	4.66	5.0	5.33
4 x 2	2.66	3.33	4.0	4.66	5.33	6.0	6.66	7.33	8.0	8.66	9.33	10.0	10.66
4 x 3	4.00	5.00	6.0	7.00	8.00	9.0	10.00	11.00	12.0	13.00	14.00	15.0	16.00
4 x 4	5.33	6.66	8.0	9.33	10.66	12.0	13.33	14.66	16.0	17.33	18.66	20.0	21.33
4 x 5	6.66	8.33	10.0	11.66	13.33	15.0	16.66	18.33	20.0	21.66	23.33	25.0	26.66
4 x 6	8.00	10.00	12.0	14.00	16.00	18.0	20.00	22.00	24.0	26.00	28.00	30.0	32.00
4 x 7	9.33	11.66	14.0	16.33	18.66	21.0	23.33	25.66	28.0	30.33	32.66	35.0	37.33
4 x 8	10.66	13.33	16.0	18.66	21.33	24.0	26.66	29.33	32.0	34.66	37.33	40.0	42.66
4 x 9	12.00	15.00	18.0	21.00	24.00	27.0	30.00	33.00	36.0	39.00	42.00	45.0	48.00
4 x 10	13.33	16.66	20.0	23.33	26.66	30.0	33.33	36.66	40.0	43.33	46.66	50.0	53.33
4 x 11	14.66	18.33	22.0	25.66	29.33	33.0	36.66	40.33	44.0	47.66	51.33	55.0	58.66
4 x 12	16.00	20.00	24.0	28.00	32.00	36.0	40.00	44.00	48.0	52.00	56.00	60.0	64.00



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Lithium has been long established in the nonferrous foundry industry as a degasifier, deoxidizer, desulfurizer and general purifying agent. The small amounts required put both the economics and technique within the limits of everyday nonferrous foundry operation. Now, tests under certain production conditions indicate that Lithium is equally valuable as a degasifier for aluminum castings. Still in the realm of research, Lithium Salts hold vast promise of valuable benefits for low temperature heat treating baths. Why don't you look into this miracle element? This revolutionary technique is within *your* reach. Write for the details.

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Industry BRIEFS

TEXAS FOUNDRIES INC., Lufkin, Tex., has started construction of a new steel foundry costing an estimated $1 million. Production of castings is expected to be under way by the end of the year. Initial production capacity of 2400 tons per year is being provided for with sufficient area under roof for later expansion. A work force of 75 to 85 people will be required. Texas Foundries, established in 1939, currently has an annual capacity for production of 10,000 tons of malleable iron castings.

Detroit Electric Furnace Division, Kuhlman Electric Co., Bay City, Mich., has appointed Brumley-Donaldson Co., Los Angeles and Oakland, Calif., its sales representative in California. Brumley-Donaldson previously handled only southern California sales. C. W. Lueders Jr., Riverton, N. J., was appointed sales agent for the division in eastern Pennsylvania, southern New Jersey and Maryland.

Mathews Conveyer Co., Ellwood City, Pa., has completed an agreement with the Foreign Trade Division of New York Hanseatic Corp., 120 Broadway, New York, under which the latter will handle the sale of Mathews conveyors and conveyor systems in all of South America and many parts of Asia, Europe and Africa.

Swartwout Co., Cleveland, has assigned responsibility for sales and service for its roof ventilator division to the Southern California district office at 317 West Main St., Alhambra, Calif. Howard L. Joseph, district manager, has been in charge of all sales in the area since the first of the year.

Wheelco Instruments Division, Barber-Colman Co., Rockford, Ill., has appointed two new representatives in Texas. R. H. Wittbold Co., 1951 Richmond Ave., P.O. Box 6061, Houston 6, will handle sales in the Houston area, and Swieco Inc., 1512 East Lancaster, Fort Worth 3, will cover the Fort Worth territory.

Pacific Valves Co., Long Beach, Calif., has acquired Phillips Foundry Co., 2200 "S" St., Bakersfield, Calif., which it will operate as a subsidiary. W. J. Gates, general manager for Phillips Foundry, will continue in that post for Pacific Valves. New owner plans an addition to the foundry.

Rampe Mfg. Co., formerly at 3320 St. Clair Ave., and 8404 St. Clair Ave., Cleveland, has moved to a new factory at 14915 Woodworth Ave., Cleveland 10, with double the combined floor space of the former plants. Company manufactures a line of tumbling and burring machines.

Midwest Precision Castings Co. has moved its offices and plant from 2790 Grand Ave., to new and larger quarters at 10703-09 Quincy Ave., Cleveland. New quarters consist of an office, engineering department and foundry building.

National Radiator Co., Johnstown, Pa., and **United States Radiator Corp.,** Detroit, have merged and will be known as National-U. S. Radiator Corp., with general offices in Johnstown. W. C. McCord, president of U. S. Radiator, is chairman of the board and Theodore B. Focke, president of National, is president of the new corporation.

Cleveland Crane & Engineering Co., 3832 East 286th St., Wickliffe, O., has begun construction of a shipping and receiving building estimated to cost $500,000. The building, which will measure 132 x 160 ft, will be equipped with the latest handling facilities.

Edwin L. Wiegand Co., 7500 Thomas Blvd., Pittsburgh 8, has appointed Harold Miles & Associates, 424 Georgia Ave., Chattanooga 2, Tenn., as its representative in Tennessee and in Alabama, north of the Tennessee River, for its line of industrial heating equipment.

Eimco Corp. has completed a new research and development center at 301 South Hicks Rd., Palatine, Ill. It is said to be the filter industries' first institution devoted primarily to research and development work in the field of liquid-solids separation.

Perfect Castings Corp., 3052 South 54th St., Milwaukee, has been formed, listing capital stock of 800 shares, no par value. Registered agents are Carl and Elizabeth M. Hunt and Janet A. Durante.

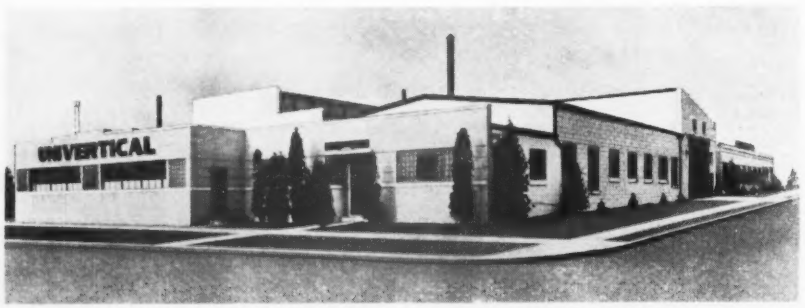
Globe Iron Co., Jackson, O., and its subsidiary, **Globe Metallurgical Corp.,** Beverly, O., have appointed Pickands Mather & Co., Cleveland, exclusive sales agent for their line of ferroalloys.

Western Foundry, 2000 East 40th Ave., Denver, plans opening of its new plant in Longmont, Colo., in the near future. Construction was begun in January.

Kemrove Fabricating & Foundry Inc., 1156 Stone Rd., Memphis, Tenn. has been incorporated, listing capital stock of 300 shares, no par value.

Foundry Supply Co., 19th St. and Tennessee River, Chattanooga, Tenn., has changed its name to Southern Foundry Supply Inc.

Assembly Products Inc., Chagrin Falls, O., has moved to a larger plant at Chesterland, O. Increased



ANODE CASTING: Univertical Foundry & Machine Co. has completed a new plant at 14841 Meyers Rd., Detroit 27, and has installed five 1-ton capacity Detroit Electric rocking-type furnaces which will be used in the production of nickel anodes for the plating industry. The furnaces have a potential capacity of 7500 lb per hour. The plant contains a total of 16,000 sq ft of manufacturing, engineering and laboratory space

ACME RESIN

PlastiSand PROCESS

Resin formulation and the coating process covered by Patents Pending

Shell molding foundries are discovering the fact that when the PLASTISAND Process, using liquid-resin coated sand, is employed—DUST IS ELIMINATED. This feature alone makes the process invaluable because of the safety and health factor. The absence of dust means healthier working conditions, safer, cleaner factories. No irritating resin dust fumes, danger of dust explosion is eliminated—plant efficiency is increased.

In the PLASTISAND Process—each grain of sand is uniformly coated with partially polymerized thermosetting resin. Permanent, even distribution of the liquid resin throughout the sand results in smoother finishes and higher strengths.

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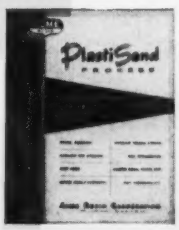
1. The PLASTISAND Process, a totally new development by Acme Resin Corporation in the relatively new field of foundry shell molding, assures savings—because of a shorter dwell, and a faster cure—shorter time on the pattern and a faster baking cycle.
2. You can be certain of superior molds with as little as *one-half* the resin content formerly necessary with dry resin.
3. Hot or cold mulling—adaptable to dump-box, roll-over and blowing of either shells or cores.
4. **SUPERIOR TENSILE STRENGTH**—PLASTISAND molds have greater cold strength, a factor gaining importance as new stack pouring techniques are developed.
5. **NON-SEGREGATING**—Each grain of sand is completely, uniformly coated with liquid phenolic resin in the PLASTISAND Process—segregation cannot occur.
6. **EXCELLENT HOT STRENGTH**—The hot strength of PLASTISAND molds is equal or superior to that obtained by the use of dry-resin sand mixes.
7. **GREATER PRODUCT UNIFORMITY**—Because it is non-segregating, resin-coated sand prepared by the PLASTISAND Process yields almost identical molds, batch after batch.

An informative booklet has been prepared to better acquaint the foundry industry with the new PLASTISAND Process. It may be obtained by writing to the ACME RESIN CORPORATION at the address listed below right.



20-POWER MAGNIFICATION OF RESIN-COATED GRAINS OF SAND.

ACME RESIN CORPORATION
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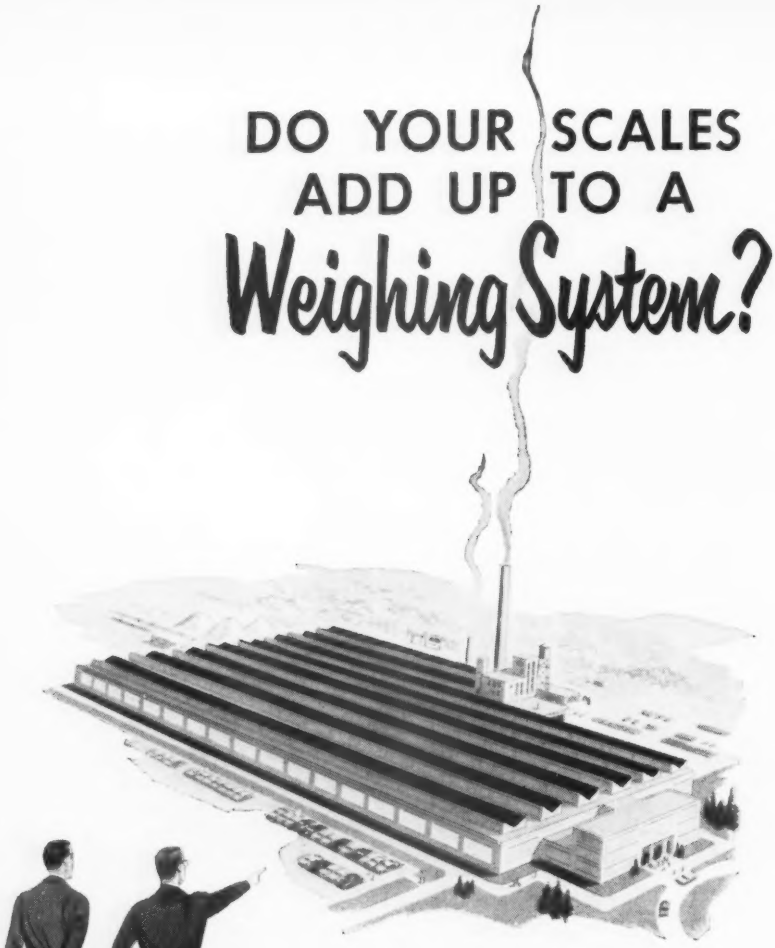
DO YOUR SCALES ADD UP TO A *Weighing System?*



TODAY IT PAYS TO TAKE A PLANT-WIDE LOOK AT WEIGHING

Do you have the *right* scales in the *right* places? A modern *Weighing System* works hand in hand with your accounting *system* and makes a *big* difference in helping you win your war on costs. Weight records that originate at scales flow to the accounting areas and directly affect costs, inventories and customer billings. Weighing errors cannot be corrected later—weights must be right the *first* time. That's why it's more than ever important to think of weighing not in terms of isolated scales, but as a vital part of your overall cost-control system.

If you would like to explore this in relation to your plant, why not drop us a line today? No obligation, of course.
Ask about the "weighing system plan."
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Toledo 1, Ohio.

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New Toledo Printweigh Scales meet your needs today for *closer cost control!* Stop human errors in reading, remembering, recording . . . provide accurately printed weights with split-second speed . . . *accurately* recorded!

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HEADQUARTERS FOR SCALES

production of meters, pyrometers and temperature controls made the move necessary.

Jervis B. Webb Co. of California, 9301 Rayo Ave., South Gate, Calif., has moved into new offices in the addition recently added at that address. Expansion of office and plant facilities allows the conveyor manufacturing company to bring administrative, sales and manufacturing departments under one roof.

Gas Machinery Co., 16102 Waterloo Rd., Cleveland 10, has appointed Heat and Control Inc. as West Coast representative for its Industrial Furnace Division. West Coast offices of Heat and Control Inc. are located at 270 Seventh St., San Francisco, 3535 East Fowler St., Los Angeles, and Second and Cherry St., Seattle.

Forker Corp., Cleveland, has appointed three new representatives for its Ohio Tramrail Systems line: Matco Products Co., 30 Church St., Buffalo, for western New York; W. R. Lloyd Co., 448 Washington Rd., Pittsburgh, for Pittsburgh and Wheeling and Charleston, W. Va., and M. H. Equipment Inc. for Peoria, Ill.

American Air Filter Co., Louisville, has opened a branch office at 1660 Gilpin St., Denver, to handle the sale of its Heyman Nelson heating and ventilating equipment. Cyril DiMercurio has been named manager of the new operation.

Kaiser Aluminum & Chemical Sales Inc., Oakland 12, Calif., has appointed R. Lavin & Sons Inc., 3426 Kedzie Ave., Chicago, a distributor of standard alloy ingot. The Lavin organization is a large smelter of brass and bronze.

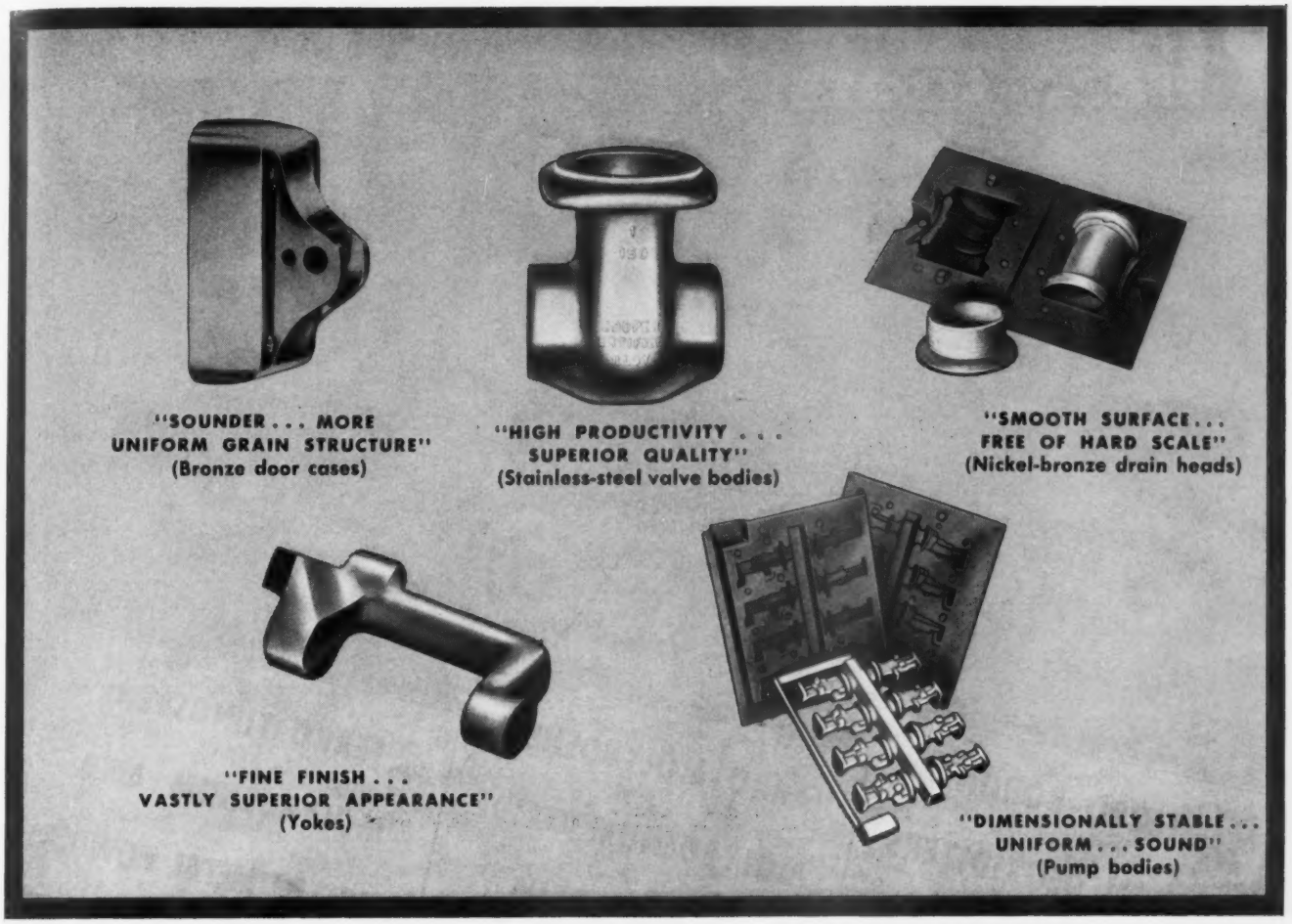
Dow Chemical Co., Midland, Mich., has added a magnesium sales group to its Philadelphia office, 1400 South Penn Square. The new group, headed by J. B. Reid, will handle all magnesium products including ingot, castings and fluxes.

Republic Steel Corp., Cleveland, has appointed Van's Equipment Sales Inc., Rensselaer, N. Y., to handle the sale and distribution of materials handling equipment.

St. Catherines Brass Works Ltd., 16 Smith St., St. Catherines, Ont., officially opened its new foundry on Mar. 31.

Missouri Steel Castings Co., 900 East Third St., Joplin, Mo., plans construction of a storage building, 52 x 46 ft, estimated to cost $6000.

Better castings for better end products . . .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(Stainless-steel valve bodies)
"SMOOTH SURFACE . . . FREE OF HARD SCALE"
(Nickel-bronze drain heads)
"FINE FINISH . . . VASTLY SUPERIOR APPEARANCE"
(Yokes)
"DIMENSIONALLY STABLE . . . UNIFORM . . . SOUND"
(Pump bodies)

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SHELL MOLDING with G-E SHELL RESINS

Examples like these show why so many foundrymen and casting buyers are turning to shell molding. Shell molding yields smoother, sounder castings—with greater dimensional accuracy—than conventional sand-casting methods. Are *you* taking advantage of shell molding for better castings for better end products?

Ask G. E. about shell molding

General Electric offers a number of foundry products to help you benefit from the shell process: *G-E phenolic shell-molding resins* to form light, dimensionally accurate molds . . . *G-E silicone parting agents* to secure quick, easy release of molds from patterns . . . *G-E phenolic bonding resins* to cement shell halves together.

FREE BOOKLET AVAILABLE

How can shell molding help YOU? General Electric maintains a shell-molding laboratory in Pittsfield, Mass., to help users and prospective users of shell molding solve problems and evaluate the process. Also, G. E. has prepared an informative 28-page manual telling about the techniques and benefits of this new foundry method. For a free copy of *G-E Shell Molding Manual*, just write to *General Electric Company, Section 522-4A, Chemical Materials Department, Chemical and Metallurgical Division, Pittsfield, Mass.*

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Operating the world's largest rare earth deposits, the Molybdenum Corporation of America has recently conducted extensive pioneering research in evaluating the properties, applications and uses of RareMeT Compound.

In nodular iron, small additions of rare earths have helped to produce consistently good ductility by counteracting subversive elements such as lead and titanium.

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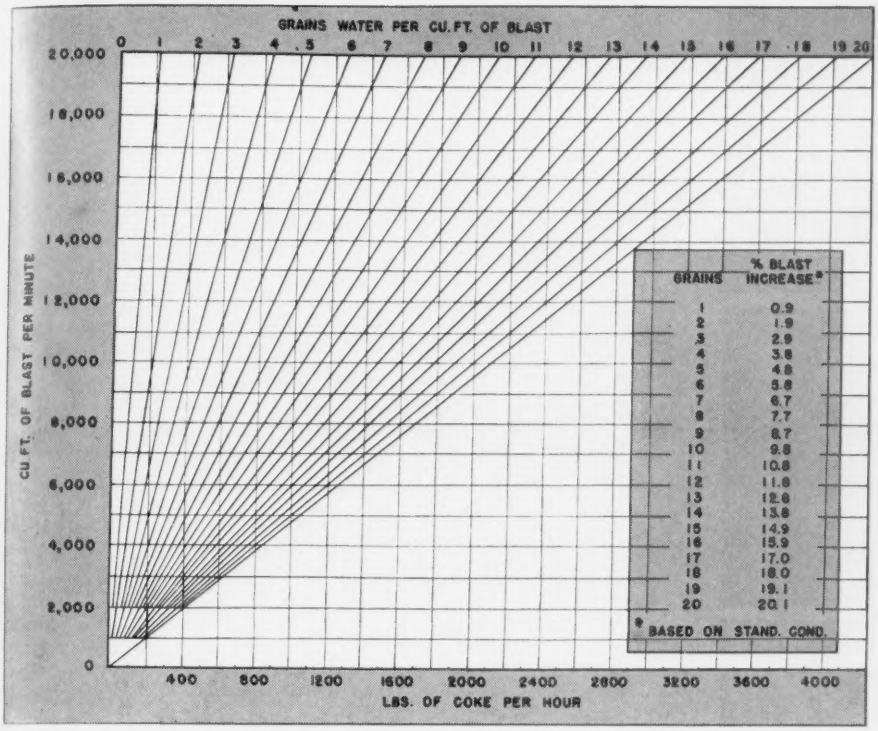
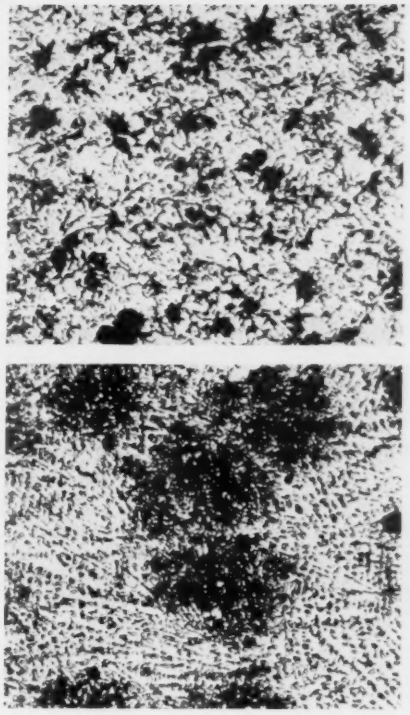


Fig. 1—Battelle Memorial Institute chart showing the additional coke and air blast adjustment needed when the moisture content increases



Figs. 2A and 2B—Micrographs of piston ring iron made under dry blast conditions. *A* (top), 3 grains moisture per cu ft, and *B* (bottom), 10 grains of moisture per cu ft. X 100

Effects of BLAST HUMIDITY on Iron Properties

By JOSEPH L. BROOKS
Muskegon Piston Ring Co.
Sparta, Mich.

INFLUENCE of moisture content of the air blast on cupola melting rate and metal quality is so well recognized that it has become good practice in the operation of some cupolas to take periodic moisture readings of the air blast. On the basis of this content adjustments are made in the coke charge and air volume. This procedure requires constant attention for satisfactory results. Some little time is required to stabilize conditions when a change is necessary. The more frequent the changes—found necessary when the moisture content varies widely—the more difficult it is to produce uniform iron of satisfactory quality.

A chart prepared by the Battelle Memorial Institute (Fig. 1) shows graphically the amount of coke that must be added to the base charge with an increase of moisture. For example, a cupola using 11,000 cfm of air containing 7 grains of water per cu ft will require 800 lb of additional coke per hour. At 10.5 gr per cu ft, 1200 lb of coke per hour must be added to the base charge. Such fluctuations, 6 to 10 grains, can be observed sometimes within a single day.

Increasing the coke charge has far-reaching effects on the entire cupola operation. Additional carbon must be supplied to react with the oxygen of the water. Since heat is necessary to produce this reaction the temperature of the metal is affected.

Chemical Analysis—Moisture content also affects the chemical analysis of gray iron. The result of a run in a cupola in which all conditions were maintained constant except the moisture content of the blast is shown in Table I.

This table shows that, with increased moisture content, total carbon and silicon content decrease and

TABLE I—How Moisture Affects Chemical Analysis

Heat No.	Moisture, Gr/cu ft	TC	CC	Mn	P	S	Si
17	21.2	2.64	.95	.70	.136	.163	1.42
18	10.4	2.92	.82	.83	.144	.162	1.58
28	1.5	2.99	.71	.79	.122	.144	1.77

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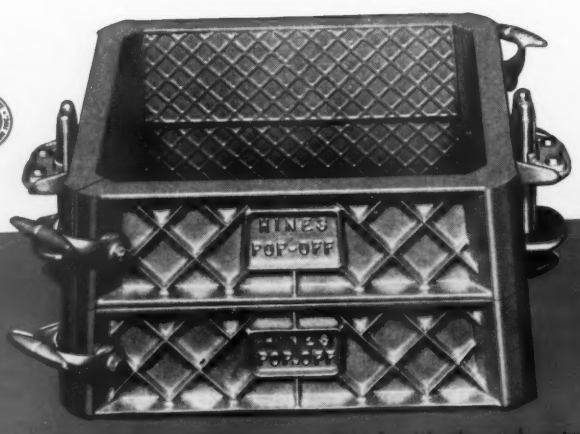

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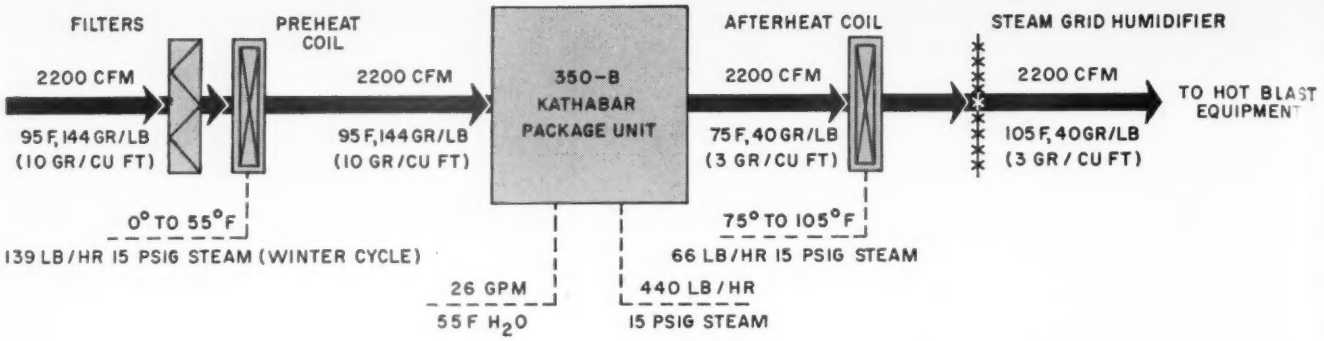


Fig. 3—Schematic flow diagram of latest dry blast system installed to deliver blast air at 3 grains per cu ft

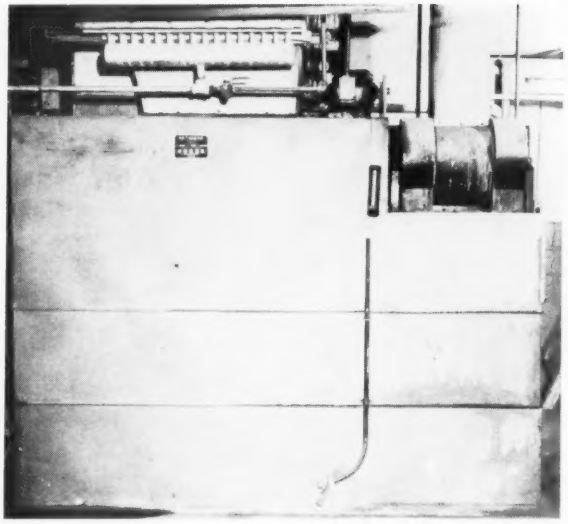


Fig. 4 — Package unit installed in Foundry No. 2 in 1948. The air washer section is on left and the regenerator section on right

combined carbon increases considerably. By actual measurement the chill depth increased from .75-in. to 1.5 in. Records show that the temperature of this metal dropped from 2580° F to 2480° F as the moisture content increased. Melting rate was also adversely affected.

In our own case we have found that piston rings become white and hard when the moisture content of the blast increases above a certain minimum. Structures resulting are shown in Figs. 2A and B. As far as we know, the only variable changed in the making of these two samples was an increase in the blast air moisture from 3 grains per cu ft for the iron in A to 10 grains per cu ft in B. Therefore, the marked increase in cementite in the B samples is attributed to the increased blast moisture. Of course, cupola operation can be adjusted to compensate for these adverse characteristics as soon as detected. However, each additional adjustment required increases the chances of producing unsatisfactory metal.

Moisture Control System—Sparta Division of the Muskegon Piston Ring Co. has for many years recognized these deleterious effects of varying moisture content upon cupola operations. In the summer of 1927 an ice machine was installed to reduce atmospheric moisture in the cupola blast by refrigeration. Although of a now obsolete design, the successful operation of this machine clearly demonstrated the benefits of moisture removal in cupola blast.

A more direct attack on atmospheric moisture was made by the use of certain solid adsorbents. These systems functioned by switching automatically the flow of air from one bed of solid adsorbent material to another on a definite schedule. While one bed was removing moisture from the air, another bed was being reconditioned by heating. In 1931, equipment of that type was installed in conjunction with the hot blast system. The equipment was far superior to the old refrigeration system, resulting in closer control and lower operating costs.

In 1940 a Kathabar absorption type dehumidifier was purchased from the Surface Combustion Corp., Toledo, O. It has since been used to maintain the moisture content of the blast at a constant 3 grains per cubic foot. This system employs a lithium chloride base solution as an air washer to remove the moisture from the blast air to any desired level. Both the dehumidification operation and regeneration of the absorbent solution are automatic. We installed additional units on the cupolas in Foundry No. 2 and No. 3 in 1943 and in 1948. The original unit, placed in operation in 1940 is still being used.

Dry Blast Operation—Shown schematically in Fig. 3 is the summer cycle flow diagram of the Kathabar unit installed in 1948 and shown in Fig. 4. When operating at maximum design load, the 2200 cfm of air handled enters the system at 95° F, 144 gr per lb (10 gr per cu ft). After filtering, the air is passed into the air washer section of the unit where it is dehumidified to 40 gr per lb (3 gr per cu ft) and 75° F. The temperature and rate of coolant flow regulate the amount of dehumidification to be performed by the lithium chloride base solution. At Muskegon, when operating at maximum conditions, 26 gallons per minute of water at a temperature of 55° F are employed.

After dehumidification the air is reheated to 105° F by an afterheating coil using, in this instance, 66 lb per hr of 15 psig steam. The 2200 cfm of air is then circulated to the hot blast system.

Regeneration is accomplished simply and automatically. A small portion of the solution, about 10 to 15 per cent, is pumped continuously to the regenerator section of the unit. There the solution is sprayed over low-pressure steam coils. This action raises the solution temperature, forcing it to give off the absorbed moisture. The excess moisture is then picked up by a scavenger air stream and purged to the outside. At Muskegon, for this maximum summer cycle, 440 lb per hr of 15 psig steam would be used. Of course, when demand is less than maximum, proportionally smaller amounts of both steam and water are employed in operating the system.

Business has a habit of going to the low-cost producer

IT's hard to sell modern casting service when that service is performed by old machines. And it's hard to match sales and profits with your competition when they operate new, faster, more efficient machines that reduce prices or improve quality of casting.

Tabor has modern machines that can help you become the *low-cost producer.* One of these machines is the 7½ hp Tabor-Brasive Cut-Oft. Here's a machine that . . .

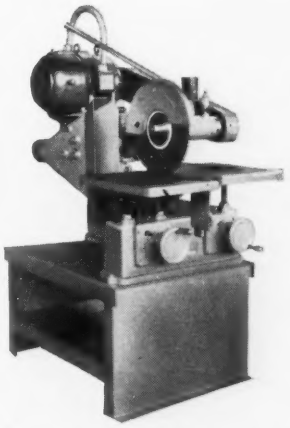
- Cuts 16 sq. in. of manganese bronze in 70 seconds
- Reduces snagging and finish grinding costs. Finished cuts are possible, depending on type of work
- Saves metal and lowers cleaning room costs—castings don't have to be cleaned before cutting
- Can be kept free of end-play year after year, for it is equipped with adjustable, precision bearings
- Can be adapted to cut bar-stock.

Ask foundrymen about their Tabor-Brasive Cut-Off Machines, and you'll hear reports such as "17 years of service . . . very low maintenance cost, clean, fast cuts . . . low wheel cost."

MR. FOUNDRYMAN:

Here's a machine that knows how to earn its keep. It's built ruggedly — doesn't lose its good performance ability with time. The Tabor-Brasive Cut-Off line ranges from 5 to 20 hp. Write for literature today.

Whatever your molding or cut-off problems may be, a Tabor engineer will be glad to study your requirements and submit recommendations, without obligation and at no cost to you. Let Tabor's more than 70 years of experience help you become a *low-cost producer.*



7½ hp Tabor-Brasive Cut-Off Machine. Split table adjustable up and down 6". Sprue support adjustment 3". Max. height of work under wheel 10". Max. height with head swung to side 44". Uses 16" dia. wheel up to $\frac{3}{16}$" thick. Clearance back of center line of wheel to hood 14". Exhaust hood has 5" outlet collar.

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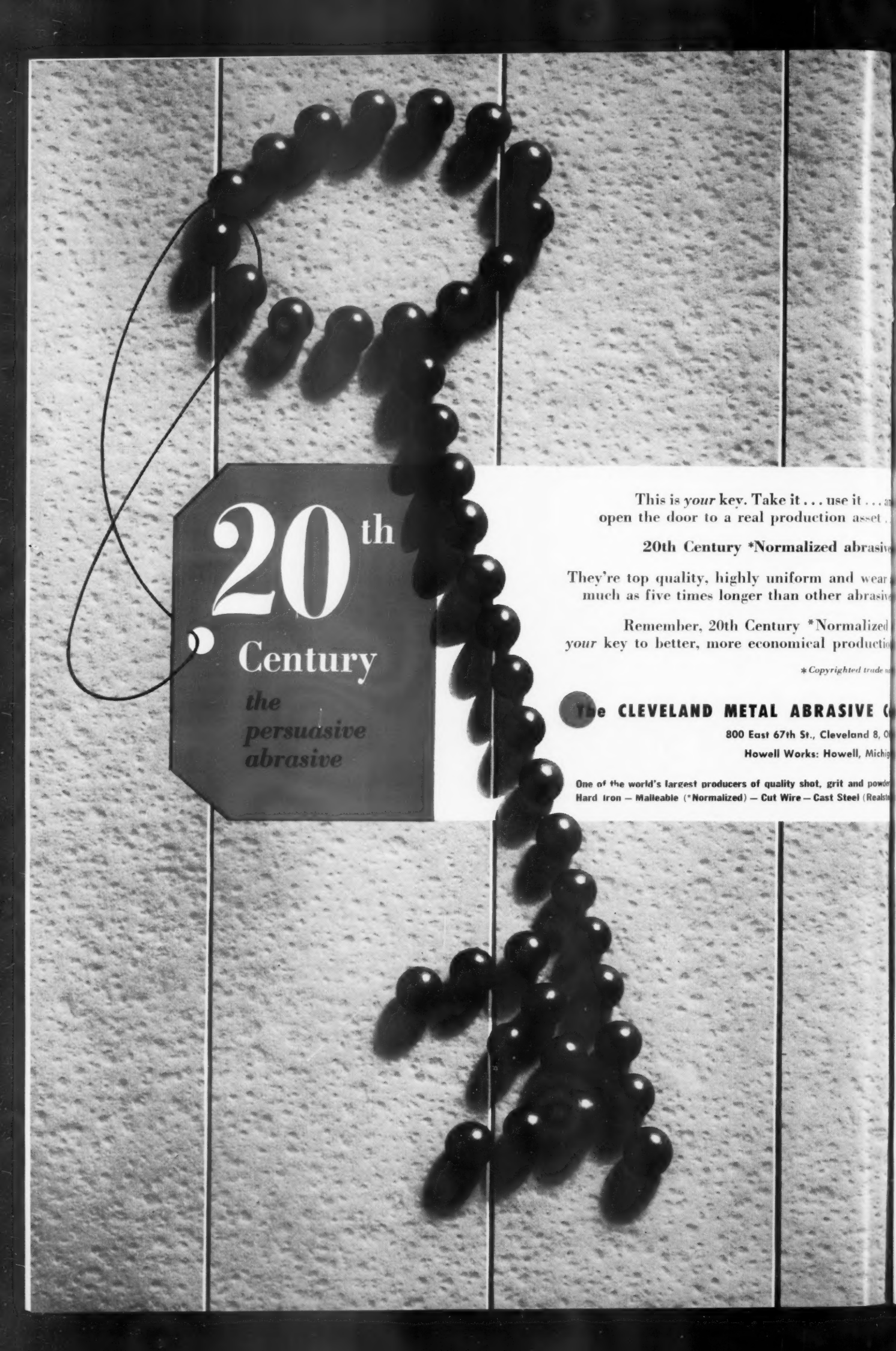
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Foundry Statistics

MALLEABLE IRON

(Shipments of castings—net tons[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1953	970,506	578,749	.....
1954			
Jan.	70,288	38,266	85,565
Feb.	69,078	37,792	81,579
Mar.	84,342	47,125	74,219
Apr.	74,515	39,102	69,094
May	67,856	37,306	67,040
June	72,820	41,121	60,163
July	50,893	25,243	63,711
Aug.	59,259	34,528	62,494
Sept.	58,015	33,929	66,742
Oct.	64,321	36,956	71,090
Nov.	70,030	41,609	80,686
Dec.	80,599	49,005	85,064
Total	812,016	461,982	.....
1955			
Jan.	82,028	48,000	99,817

ALUMINUM

(Shipments of castings—1000 pounds)

	Shipments				Unfilled Orders[2]
	Total	Sand	Perm. Mold	Die	
1953	658,022	214,553	200,025	239,330	.....
1954					
Jan.	51,446	14,698	16,615	19,709	103,318
Feb.	51,213	14,696	17,281	18,754	96,011
Mar.	56,184	14,468	19,576	21,645	93,407
Apr.	53,006	14,073	18,091	20,366	91,853
May	47,663	12,461	16,312	18,368	83,848
June	48,061	12,442	17,105	17,886	79,126
July	39,636	11,299	13,749	14,004	76,513
Aug.	42,429	11,252	15,335	15,213	76,684
Sept.	46,249	10,717	16,641	18,228	79,873
Oct.	53,901	12,765	19,238	21,245	88,518
Nov.	55,224	12,934	20,396	21,296	94,491
Dec.	64,045	13,753	23,629	26,017	99,556
Total	609,057	155,558	213,968	232,731	.....
1955					
Jan.	64,414	13,358	22,520	27,978	102,382

COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments			Unfilled Orders[2]
	Total	Sand	Perm. Mold	
1953	990,496	888,369	61,316	.....
1954				
Jan.	71,437	63,034	4,618	42,351
Feb.	68,849	60,913	4,743	21,943
Mar.	76,480	67,952	5,123	38,417
Apr.	72,900	65,418	4,732	34,111
May	67,859	61,469	3,755	31,568
June	70,777	64,328	3,567	30,743
July	56,380	51,070	3,073	30,872
Aug.	68,891	63,389	3,547	28,883
Sept.	68,267	62,152	3,637	31,087
Oct.	70,276	63,855	3,619	30,296
Nov.	70,020	63,065	4,089	27,508
Dec.	72,421	65,159	4,346	31,954
Total	834,557	751,804	48,849	.....
1955				
Jan.	72,233	64,540	4,678	30,864

MAGNESIUM

(Shipments of castings—1000 pounds[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1953	34,517	31,469	.....
1954			
Jan.	2,451	2,149	8,800
Feb.	2,194	1,945	8,315
Mar.	2,407	2,109	7,698
Apr.	2,068	1,857	7,358
May	1,738	1,541	7,522
June	2,034	1,820	8,296
July	1,924	1,712	8,073
Aug.	2,157	1,944	7,795
Sept.	2,059	1,855	7,474
Oct.	2,092	1,876	7,294
Nov.	2,161	1,906	6,867
Dec.	2,287	2,031	6,678
Total	25,572	22,745	.....
1955			
Jan.	2,305	2,067	7,236

PRODUCTION WORKERS

Estimated Number

(Thousands)

	Dec. 1954	Nov. 1954	Dec. 1953
Ferrous	190,200	186,900	202,500
Nonferrous	64,700	63,500	70,800

Average Weekly Earnings

Gray Iron	77.36	76.02	74.40
Malleable Iron	79.17	78.60	73.34
Steel	78.38	75.60	78.80
Nonferrous	84.86	84.85	81.61

Average Weekly Hours

Gray Iron	40.5	39.8	40.0
Malleable Iron	40.6	40.1	38.6
Steel	38.8	37.8	39.6
Nonferrous	40.8	40.6	40.6

Labor Turnover Rate (December)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	4.7	2.5	0.8	1.1
Malleable Iron	4.2	2.0	0.8	0.8
Steel	4.3	2.5	0.5	1.7
Nonferrous	3.4	4.3	1.0	2.6

Source: Bureau of Labor Statistics

GRAY IRON CASTINGS—SHIPMENTS (Net Tons[1])

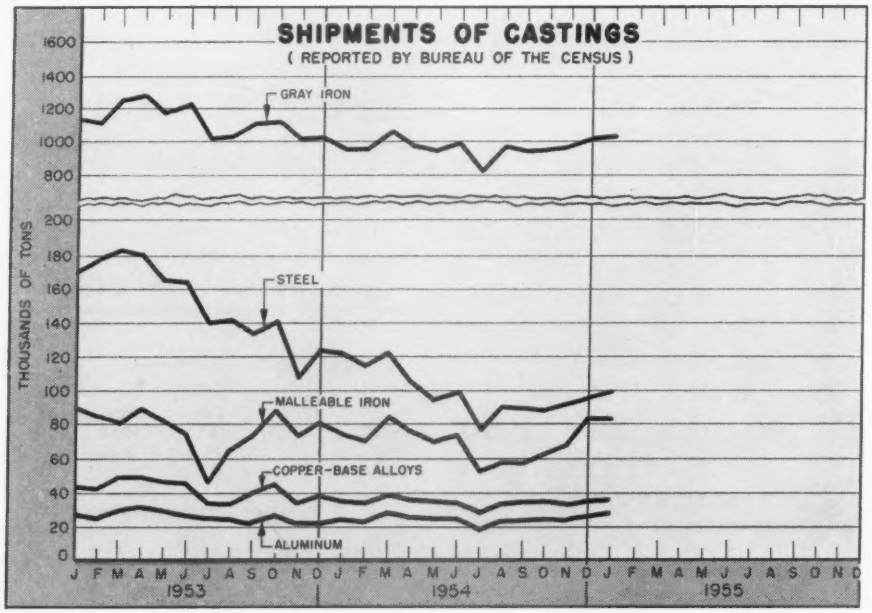
	All Castings		Miscellaneous Castings		Heavy Steel Ingot Molds		Chilled Railroad Car Wheels	Pressure Pipe & Fittings	Soil Pipe & Fittings	Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	Total	Total[3]	Total[3]	
1953	13,707,902	7,494,843	8,449,837	3,675,454	2,829,159	1,389,483	467,142	1,285,598	677,166	.....
1954										
Jan.	932,298	488,497	607,755	261,164	154,359	60,947	31,316	90,898	47,970	871,918
Feb.	936,364	491,983	607,085	252,591	156,933	70,261	29,240	92,546	50,560	865,344
Mar.	1,046,779	553,358	684,272	282,328	153,366	65,950	34,240	113,016	61,895	842,499
Apr.	995,052	528,027	657,126	263,147	126,083	56,114	29,075	116,420	66,348	826,491
May	943,335	516,475	605,385	247,623	122,839	57,106	27,144	122,514	65,453	775,278
June	986,810	556,047	616,317	261,133	141,712	70,060	30,883	130,503	67,395	803,570
July	821,151	449,621	510,173	209,294	131,180	62,681	22,902	98,810	59,086	828,924
Aug.	934,644	541,904	569,790	250,702	140,165	69,897	29,134	127,255	68,300	829,505
Sept.	921,232	533,909	559,934	248,124	139,679	68,053	25,374	124,821	71,424	810,654
Oct.	942,934	552,022	570,365	253,802	150,282	79,191	23,599	130,326	68,362	789,117
Nov.	997,301	547,447	623,390	258,933	167,983	85,703	25,723	118,480	61,725	759,613
Dec.	1,074,258	563,699	680,700	276,045	200,044	97,936	27,229	111,082	55,203	744,633
Total	11,532,158	6,322,989	7,292,292	3,064,886	1,784,625	843,899	325,859	1,376,671	743,721	.....
1955										
Jan.	1,091,923	563,153	712,097	282,386	192,132	97,007	25,783	100,638	61,273	782,656

STEEL CASTINGS—SHIPMENTS (Net Tons[1])

	All Castings			Carbon			Alloy			Unfilled Orders[2]
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	
1953	1,834,197	1,400,013	321,010	1,276,729	959,493	293,491	557,468	417,148	27,519	.....
1954										
Jan.	122,758	93,577	20,197	83,927	63,716	19,235	38,831	30,828	1,790	251,847
Feb.	116,520	88,699	17,938	81,433	60,810	15,961	35,087	28,061	1,967	234,634
Mar.	122,310	92,271	15,684	85,211	63,137	14,190	37,099	29,316	1,494	214,367
Apr.	105,788	78,754	11,031	72,118	52,652	9,538	33,670	26,365	1,493	197,857
May	94,610	70,596	9,454	64,546	46,768	8,342	30,064	22,945	1,112	182,502
June	100,022	72,881	8,639	69,021	48,370	7,552	31,001	24,554	1,087	169,594
July	75,848	53,207	5,815	50,453	33,461	4,964	25,395	19,746	851	170,567
Aug.	89,590	66,792	9,844	61,344	44,236	8,148	28,256	22,556	1,196	168,303
Sept.	88,359	64,722	8,668	59,039	41,735	7,690	29,320	22,987	978	158,823
Oct.	87,085	64,004	8,580	56,705	39,872	7,596	30,380	24,132	984	154,079
Nov.	87,659	64,812	7,742	56,057	40,085	6,624	31,602	24,727	1,118	175,715
Dec.	93,547	69,843	12,489	62,967	45,632	10,469	30,841	24,211	1,020	179,148
Total	1,184,096	880,158	135,581	802,821	580,474	120,309	381,285	303,428	15,090	.....
1955										
Jan.	98,238	75,044	13,809	67,397	49,816	12,762	30,841	25,228	1,047	201,839

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.

FOUNDRY STATISTICS



COMMERCIAL HEAT TREATING

(National Billings of Metal Institute Members)

	1952		1953		1954	
	No. Reporting	Total Reported	No. Reporting	Total Reported	No. Reporting	Total Reported
July	56	$2,253,346	58	$2,522,651	61	$1,722,449
Aug.	57	2,287,135	60	2,452,186	62	1,801,659
Sept.	57	2,498,544	57	2,522,127	64	1,853,665
Oct.	57	2,837,574	59	2,782,219	62	1,916,504
Nov.	53	2,321,932	59	2,493,497	60	1,966,333
Dec.	52	2,431,975	57	2,219,406	62	2,099,847
Annual total		30,875,924		31,733,067		24,244,368

COKE PRODUCTION AND CONSUMPTION

(Net tons)

	Production	Consumption Total	Consumption By Foundries
1953	78,467,806	78,227,414	2,915,430
1954			
Jan.	5,812,426	5,639,117	224,298
Feb.	4,889,717	4,920,651	211,134
Mar.	5,146,189	5,177,765	228,129
Apr.	4,693,036	4,569,843	212,272
May	4,802,245	4,656,950	204,958
June	4,640,064	4,683,726	194,664
July	4,618,665	4,555,701	170,617
Aug.	4,510,603	4,501,477	195,344
Sept.	4,490,603	4,434,650	191,607
Oct.	5,082,374	5,100,135	208,418
Nov.	5,230,237	5,283,916	221,391
Dec.	5,610,564	5,615,228	217,104
Total	59,526,723	59,139,159	2,479,926
1955			
Jan.	5,798,887	5,854,215	234,050

INGOT BRASS AND BRONZE

(Shipments in net tons)

	1954	1955
Jan.	20,661	25,201
Feb.	19,920	.....
Mar.	23,653	.....
Apr.	24,746	.....
May	22,269	.....
June	22,348	.....
July	17,074	.....
Aug.	21,684	.....
Sept.	22,464	.....
Oct.	24,080	.....
Nov.	23,061	.....
Dec.	21,273	.....
Total for year	263,233	25,201

ZINC-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments Total	Shipments For Sale	Unfilled Orders[2]
1953	521,253	349,022	.....
1954			
Feb.	37,660	24,112	55,351
Mar.	42,991	28,828	52,544
Apr.	38,968	25,211	51,388
May	36,793	23,671	46,726
June	40,708	26,890	47,537
July	28,306	18,605	43,231
Aug.	34,639	24,898	46,288
Sept.	36,594	25,617	56,006
Oct.	39,072	27,337	64,500
Nov.	48,437	35,207	62,750
Dec.	54,410	35,211	69,403
Total	434,785	295,587	.....
1955			
Jan.	58,586	35,472	70,691

INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1954	1955
Jan.	173.8	81.0
Feb.	99.9	....
Mar.	82.7	....
Apr.	125.3	....
May	80.8	....
June	86.4	....
July	68.8	....
Aug.	75.6	....
Sept.	68.3	....
Oct.	147.5	....
Nov.	61.4	....
Dec.	113.9	....

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent (monthly average). This is a new base period. Source: Foundry Equipment Manufacturers Association.

IRON AND STEEL SCRAP CONSUMPTION

(Gross tons*)

	All Scrap Total	By Types of Furnace: Cupola Total	Air Total	Electric Total
1952	61,625,549	9,154,146	1,053,233	8,015,064
1953				
Dec.	4,690,277	755,276	68,002	442,818
Total	69,005,976	9,676,463	1,026,334	8,263,880
1954				
Jan.	4,574,384	711,335	71,202	505,536
Feb.	4,385,340	704,535	67,263	462,095
Mar.	4,637,573	783,529	82,337	517,702
Apr.	4,582,862	748,766	79,183	518,048
May	4,776,603	710,159	67,368	506,582
June	4,664,561	725,910	75,306	515,019
July	3,909,336	565,275	45,920	420,564
Aug.	4,164,703	671,631	65,336	486,596
Sept.	4,298,495	675,593	68,860	500,349
Oct.	4,782,488	710,127	67,678	528,432
Nov.	4,928,850	737,286	71,844	573,298
Dec.	5,075,563	798,435	92,910	566,223
Total	54,780,758	8,542,581	855,207	6,100,444

PIG IRON PRODUCTION AND CONSUMPTION

	Production** (standard grades—net tons) Total	Foundry	Malleable	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace—gross tons) Total	Cupola	Air	Electric
1953	74,879,511	2,599,307	3,736,431	60,465,016	8,347,825	66,637,364	4,918,480	272,311	164,267
1954									
Feb.	4,764,613	156,178	272,707	3,911,670	424,058	4,293,942	351,824	17,257	9,892
Mar.	4,907,147	213,249	243,356	3,977,137	473,405	4,367,814	390,929	21,369	13,112
Apr.	4,449,289	155,249	256,662	3,630,901	406,477	4,021,957	375,045	26,553	10,497
May	4,572,252	154,768	231,479	3,741,671	444,334	4,188,269	367,437	16,453	16,531
June	4,683,629	175,759	200,154	3,853,444	454,272	4,297,531	375,601	18,545	14,196
July	4,590,076	182,130	182,527	3,790,999	434,420	3,990,431	293,926	12,258	13,317
Aug.	4,529,291	186,097	165,891	3,722,094	455,209	4,013,552	354,067	15,926	10,325
Sept.	4,417,888	188,599	179,629	3,622,799	426,861	4,005,578	346,698	16,984	11,654
Oct.	4,937,436	212,237	248,643	3,979,437	497,119	4,518,770	367,063	16,186	11,307
Nov.	5,204,446	202,824	263,484	4,233,253	504,885	4,764,215	375,526	16,178	15,932
Dec.	5,526,720	229,717	259,423	4,510,772	526,808	4,978,200	403,726	19,829	13,917
Total	58,113,924	2,241,436	2,798,646	47,485,047	5,587,465	52,373,541	4,364,418	215,158	155,258
1955									
Jan.	5,729,404	243,608	272,451	4,703,875	509,470	.....	.....	.....	.....
Feb.	5,394,585	209,852	252,860	4,425,080	506,793	.....	.....	.....	.....
Total	11,123,989	453,460	525,311	9,128,955	1,016,263	.....	.....	.....	.....

*Source: U. S. Dept. of Interior. Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only.

FOR PRECISION
DIE-CASTING . . .
THE IMPROVED

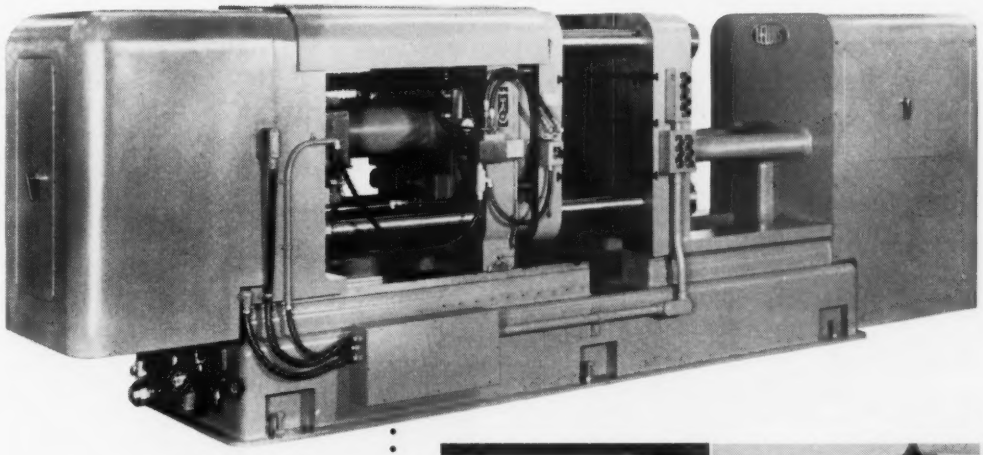
LEWIS 650-B

GIVES YOU FASTER
PRODUCTION . . .
MINIMUM SCRAP . . .
GREATER PROFIT

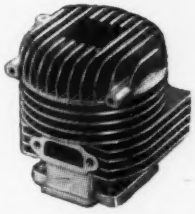
New and improved controls . . . a re-designed injection system . . . the exclusive "HYDRA-LOCK" clamp . . . and other outstanding features make this LEWIS die-forge casting machine tops in its trade.

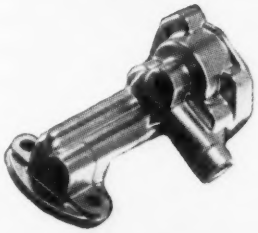
Versatile Model 650-B produces accurate pressure-tight light-metal castings with minimum scrap. All operations, except actual pouring, are either automatic or pushbutton controlled. Maximum safety is assured by the 650-ton clamping pressure and positive locking action of the "HYDRA-LOCK" clamp.

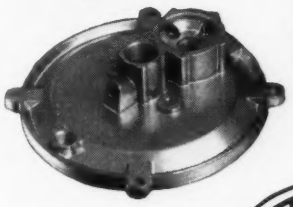
With eight years of research and pilot tests behind it, the LEWIS 650-B has been further refined . . . through "perfectionist" engineering and actual production operations . . . until it is the most advanced design available to the die-casting industry today.

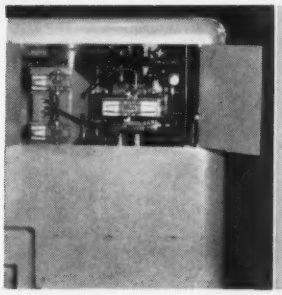


hydra-lock BY LEWIS

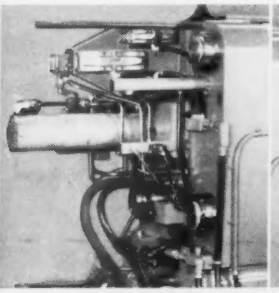




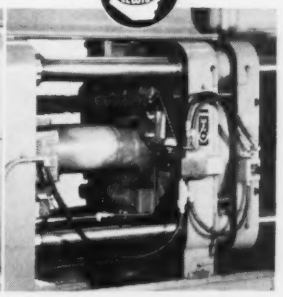




Variable two-stage injection system develops pressures up to 100,000 pounds to assure dense flawless castings. Access doors in detachable hood permit rapid adjustment.



All valves and cylinders for moving platen, clamp mechanism and sliding-block locking device are mounted in one location for fast, easy adjustment and maintenance.



"HYDRA-LOCK", a new clamp principle exclusive in LEWIS machines, utilizes a large-diameter short-stroke hydraulic cylinder to develop final closing and locking pressures up to 650 tons.

Write today for Bulletin 103 for complete details.

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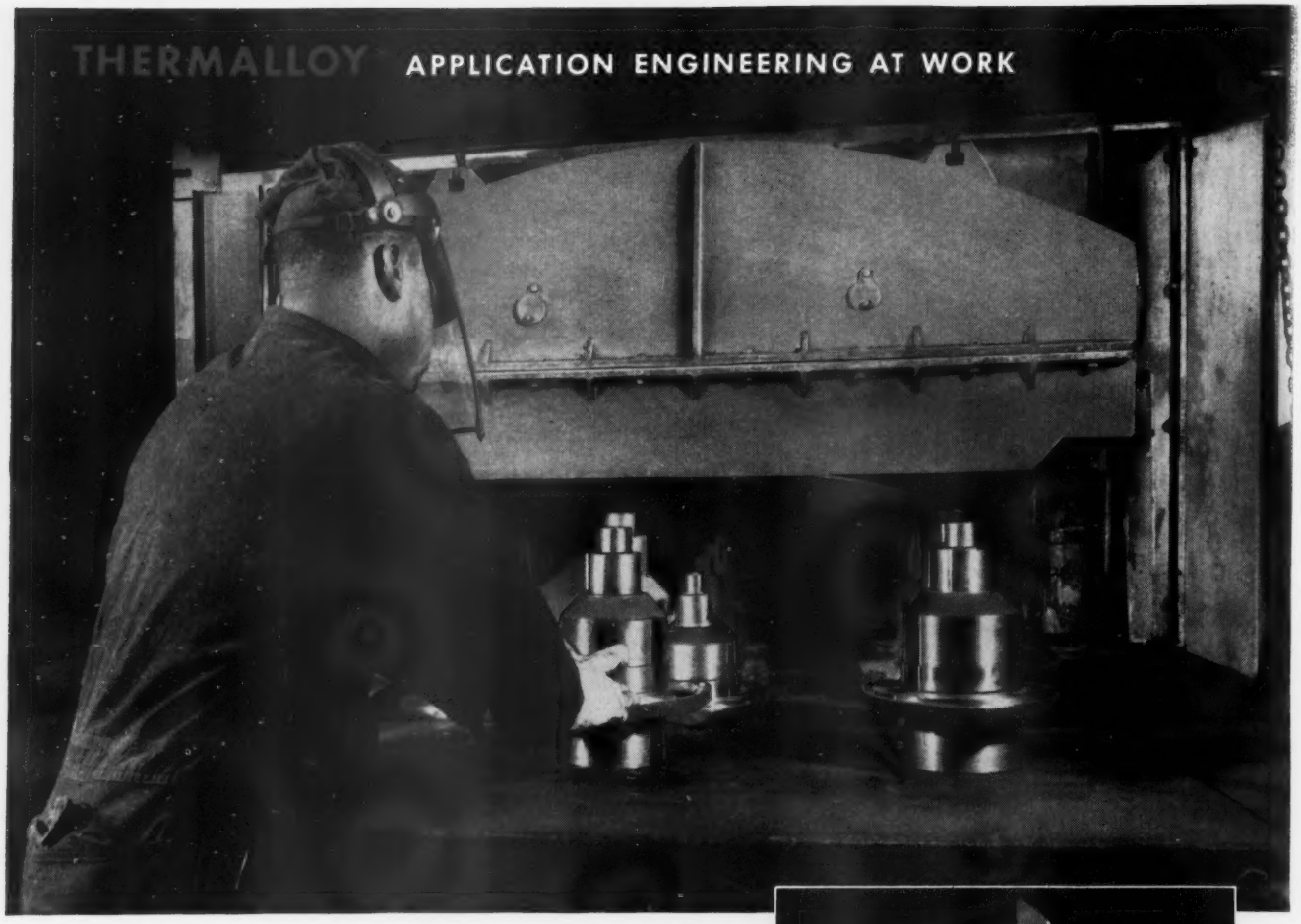

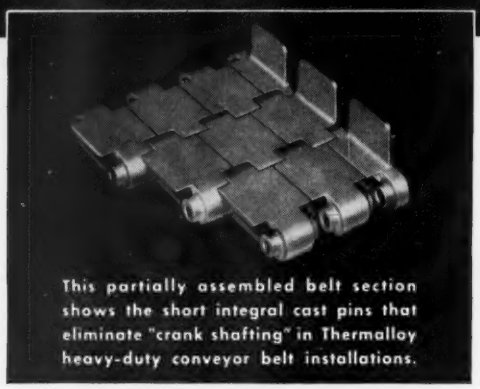

This partially assembled belt section shows the short integral cast pins that eliminate "crank shafting" in Thermalloy heavy-duty conveyor belt installations.

specify THERMALLOY FURNACE CONVEYOR BELTS for heavier loads at high heat

55″ wide on bearing centers of 32′, this new furnace conveyor belt at Commonwealth Industries, Inc., Detroit, carries over 35 lbs. per sq. ft. in normal service. At times, a total of 5,000 lbs. and more is loaded on the belt. And it's versatile! Work ranges from ½ lb. to 100 lbs. per piece, temperatures up to 1650°.

Here was the problem. Commonwealth, modern commercial heat-treater for the automotive industry, needed a belt which could carry small and large parts to be heat-treated, in volume. They asked Electro-Alloys to help. Starting with the Thermalloy heavy-duty belt design, Electro-Alloys engineers designed special side links to keep the small work from rolling off into the furnace bed. The results have been higher production at less cost for Commonwealth, and another successful case history of Thermalloy application engineering at work.

Our permanent staff of engineers is ready to help *you* design, improve or modernize the alloy in your heat-treating installations. Thermalloy heat-resistant alloys are cast for many furnace and other heat-treat applications. Write us in Elyria, Ohio, for Conveyor Belt Bulletin T-241, or call any of the sales offices listed below.

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Good Public Relations—Publicity Isn't Enough

There's More to It Than Merely Spending Dollars

By Howard M. Duffy

WHEN I recently walked into a New York office building and asked the elevator operator for the floor number of the general offices of a large national sales organization I received a sudden jolt by the man's reply.

"Them slobs! Well, they are on the top floor, but I don't know why you want to do business with them."

While riding up on the elevator I wondered what could have caused the operator to harbor so much resentment toward the firm upon which I was calling. Certainly the organization had done a good job of publicizing its attributes as far as magazine and newspaper coverage was concerned. In fact, my only prior knowledge of the firm had been gained through its publicity and advertising.

During my ascent to the top floor, the operator further enlightened me by stating that his main gripe with the firm was the fact that it was a slovenly and inconsiderate tenant. This was perhaps a minor factor from the standpoint of public relations, but it became greatly magnified when one considered that so many of the firm's customers and prospects had to run the gauntlet represented by the disgruntled elevator operator.

Through my later contact with this firm I discovered that it was also having a great deal of difficulty in maintaining a staff of contented employees and was plagued by the added costs of large employee turnover. Further investigation revealed that this corporation was laboring under the idea that it was carrying on a good public relations job, because it was spending thousands of dollars yearly on publicity.

Here was a prime example of an organization confusing a publicity project with a public relations program.

Waste Comes Easy—Are you wasting your public relations dollar? It's easy to do if you think of your public relations program as only a publicity project.

You can hire a publicity expert to tell the nation how much better your product is than those of your competitors. Or he might be hired to blare out that your firm produced "X" miles of tastier pretzels last

CESCO RIGHT... before your Eyes!

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HEALTHGUARD ABRASIVE MASK
used under
DURATEX HOOD
for complete sand blast protection

BM Approval No. 1918

Features—

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- Exclusive head harness and buckle design
- Flexible lead-in hose
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- Automatic pressure relief valve
- One-way exhaust valve
- Duratex hood with guarded safety glass

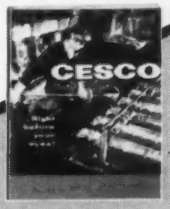
CESCO No. 602

Maximum Wearing Comfort

• The soft, moulded rubber facepiece of the CESCO No. 602 mask makes a comfortable, leak-proof fit. Once head harness is adjusted to fit, mask can be slipped off and on without readjustment. Flexible lead-in hose allows free movement of head.

Uses—The CESCO No. 602 mask with Duratex hood gives complete protection against sand, shot, and grit in foundries, steel mills, and refineries. Its utility adapts it for use in shops doing sand blasting and metallizing. Workers produce more when equipped with a CESCO No. 602.

SEE *your CESCO Safety Equipment distributor*
TODAY *or write us for details*



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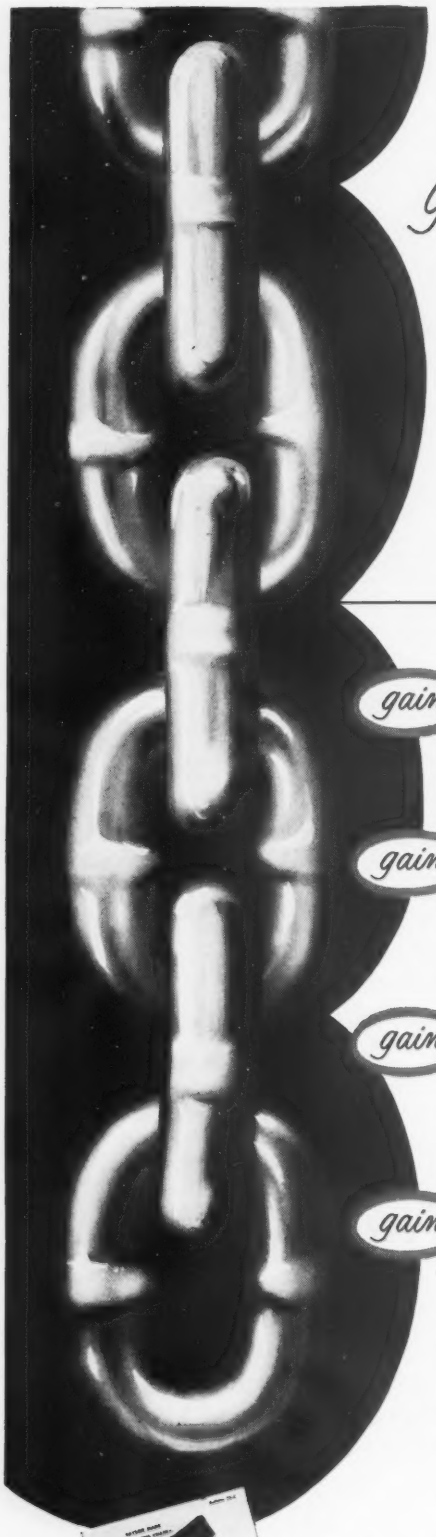

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TAYLOR MADE
Alloy Steel
CHAIN!

gain **Extra Strength!** It's a simple fact that Taylor Made Alloy Steel Chain has twice the tensile strength (125,000 lbs. P.S.I.) of wrought iron types (48,000 lbs. P.S.I.).

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year. On the other hand, you may establish a so-called public relations department within your organization with specific instructions to its employees to have every newspaper, magazine and radio station in the land say something complimentary about Fiegelmeier's Pretzels.

If you are on this track, don't kid yourself into believing that you are building sound public relations—this is publicity, only one of the tools of public relations. As long as you are going to spend money on improving your relations, let's assemble a full tool kit and do the job correctly. The correct approach to the problem will save dollars in the long run.

Whether one wishes it or not, every person and every organization has public relations—either good or poor, or perhaps just so-so. Your immediate desire is to establish good, or to correct poor, relations with your public. You have realized by now that you cannot turn these relations on or off like a faucet. So what are you going to do about it?

Begin at Home—To start with, you can't go astray if you accept the truism of most leaders in the field that sound public relations, like charity, begin at home. Dependent upon your kind of business, home is your factory, warehouse, office, sales territory or wherever you conduct your business. Within your home you must reach (1) your employees, (2) your community, (3) your customers and prospects, and (4) your stockholders. In addition, you may have special publics whom you contact, but these four are constantly with you. They are the four basic areas of public relations.

Concerning the first of these areas, a sound public relations program should materially aid in bridging the ancient gap between management and labor. Your public relations department will voluntarily, or involuntarily, discover your employees' opinion of you as an organization or employer. It is better that you go to your employees to obtain this opinion, rather than have them come to you. The logic in this lies in the fact that if they come to you, the employees may have fire in their collective eyes, and you will not be able to select the time or place of battle—or even have the choice of weapons.

All of this means that we must have machinery set up to handle employee grievances as well as other matters in which your workers are intensely interested. The main idea is to inform your employees that your organization is a fine employer—then go out and prove it by action

well worth looking into

Here are some facts well worth looking into to make sure you choose the right core oil for making your casting. First, Penolyn Core Oil assures you maximum foundry efficiency. Second, there is a grade of Penolyn Core Oil to meet the most exacting requirements of every Foundry and Core Room practice. Third, and most important —

If you require expert technical assistance or technical data regarding your present or future casting operations, just call the Penola Office nearest you.

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for these 10 important casting advantages:

1. Dependable uniformity
2. Concentrated form
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4. Seepage eliminated
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8. Polymerized formulation
9. Minimum gas
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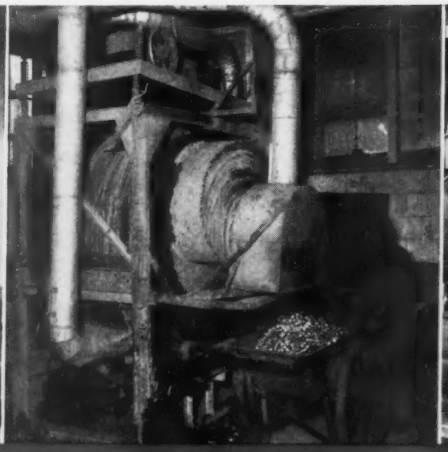
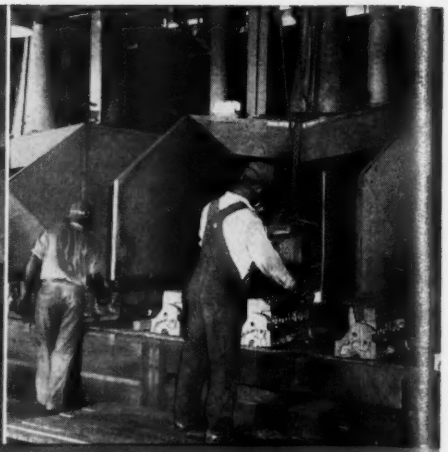
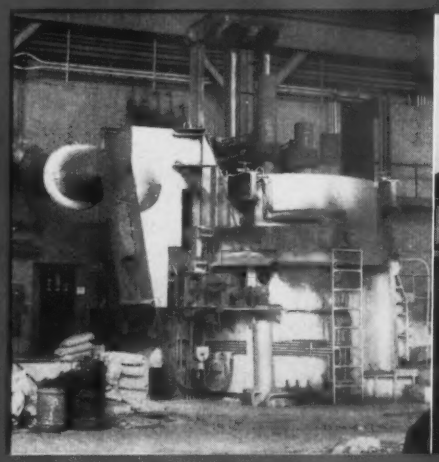
Blast Cleaning Ventilation



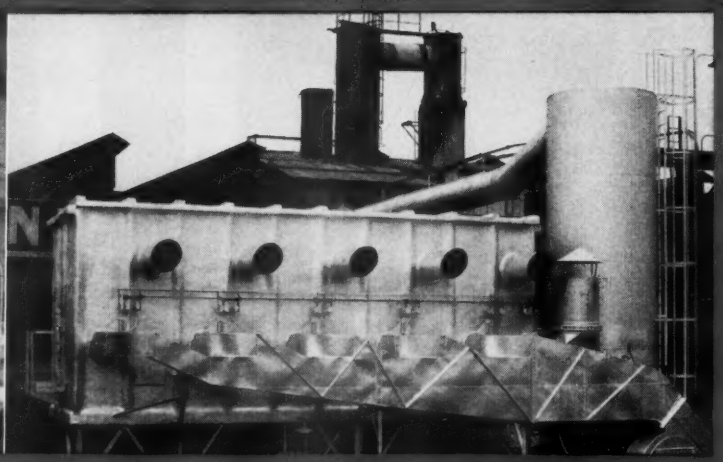
Sprue Mill Ventilation



Casting Grinding Ventilation



Electric Furnace Fume Control



Gray Iron Cupola Fume Control

Everywhere in the Foundry

WHEELABRATOR® DUSTUBE®

Controls Dust and Fume — Economically!

Wherever dust and fume occur in a foundry — electric furnaces, gray iron cupolas, grinding, blast cleaning, sand handling, sprue mills, etc. — the high efficiency of Wheelabrator Dustube cloth type Collectors provides economical control.

Collection efficiencies approaching 100% are commonplace, yet simplicity of design means economy of installation and operation. This combination of simplicity, efficiency and economy has made Wheelabrator dust collectors the choice of foundries of every size and type.

Complete descriptive literature is available on these foundry ventilating and fume control problems.

Write today for literature on your particular dust or fume problem.

American **WHEELABRATOR®** *efficiency and economy in dust collection*

AMERICAN WHEELABRATOR & EQUIPMENT CORP., 505 S. Byrkit Street, Mishawaka, Indiana

rather than mere words. These are the types of actions successfully used by a large western aircraft manufacturer to reach its first area of public relations, the employees:

1. This firm has a management policy which is reduced to writing and available for employees' study. This was accomplished through the employees' magazine.

2. Their public relations men are in close contact with other employees, but they don't operate an espionage system.

3. They attempt to make every employee a good-will representative for the firm by treating each as a human being.

4. They have made their plant a safe place to work.

5. They have planned for the future security of their employees by providing retirement, thrift and health plans.

6. They pay a fair wage.

7. They recognize ability for advancement.

The above ideas just scratch the surface. It is up to the management to first ascertain employee needs, then take positive steps to satisfy these needs. Above all, let your employees know that you are out to help them.

Community Relations—Now to examine the second area of public relations—your community. It is wise to have your neighbors say complimentary things about your business. In order to secure this result, you must have a genuine interest in the community, fitting it into your overall public relations program. No better endorsement of your business can be had than that in which a community pitches in to help in times of floods, fires or financial losses which so often beset various industries.

Mending poor relationships with the community is a slow and laborious process, but the results are well worth every effort.

Here are a few devices which have paved the way to better community relations for a New York state plastics manufacturer:

1. The firm treats the complaints of local citizens with the utmost courtesy.

2. The plant purchases whatever it can from local suppliers.

3. Executives are made available for participation in community affairs.

4. Local newspapers and radio stations are given a better than fair break in news releases.

5. They haven't overlooked the value of an annual open house. This is an easy way to sell yourself to local residents.

6. The plant participates in local welfare activities, but does not coerce employees regarding contributions.

7. The firm interests the future citizens by co-operating in many matters with the local schools.

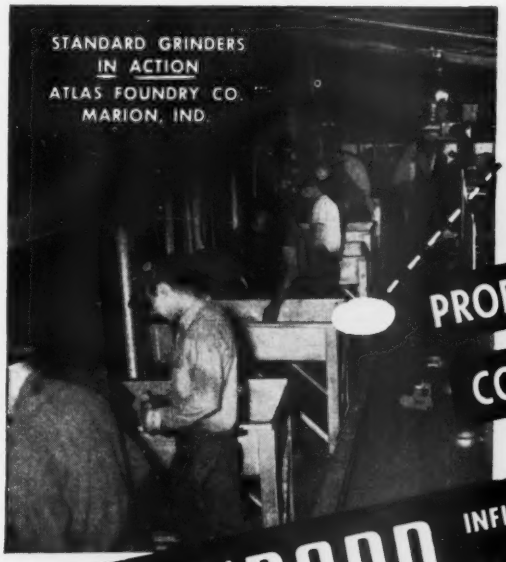
8. Job applicants are treated courteously.

9. It is mindful of the appearance of the plant and grounds.

Community relations, like employee relations, are very much a matter of common sense. In any case, do not overlook the appeal to the women of the community, for we all know how often, and how consistently, they make up the minds of the male population. Some factories even exercise smoke control on Mondays to help eliminate housewifely frets on the traditional washday.

Your Customers—Our third area of public relations—relations with customers and prospects—is the one in which most firms place the greatest emphasis. After all, this is where the money comes from, and relations with this group are tied in with quality and price of goods.

Our goal in this area is to create



X MARKS THE SPOT . . . where

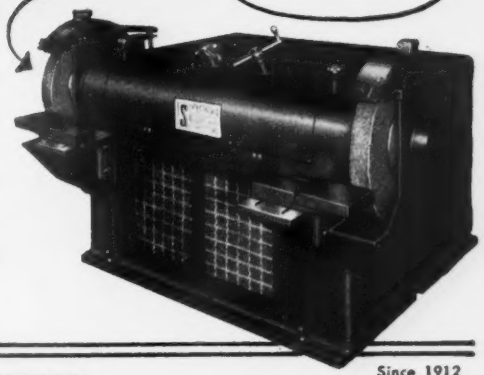
PRODUCTION'S UP 28%

COST IS DOWN 23%

with

STANDARD INFINITELY VARIABLE SPEED SNAGGING GRINDERS

HAND WHEEL Automatically ADJUSTS WHEEL SPEED!



Castings are on the move in Marion! . . . costs cut, production upped, shut-down time nil. And that's the story wherever STANDARD'S Twin-Wheel Snagging Grinders are on the job! Sizes to 100 hp, 20" to 30" wheels. Get the facts today . . . facts that mean a new kind of profit-FUTURE for your foundry. WRITE FOR LITERATURE.

Since 1912

the STANDARD electrical tool co.

SNAGGING GRINDERS AND MACHINE TOOLS

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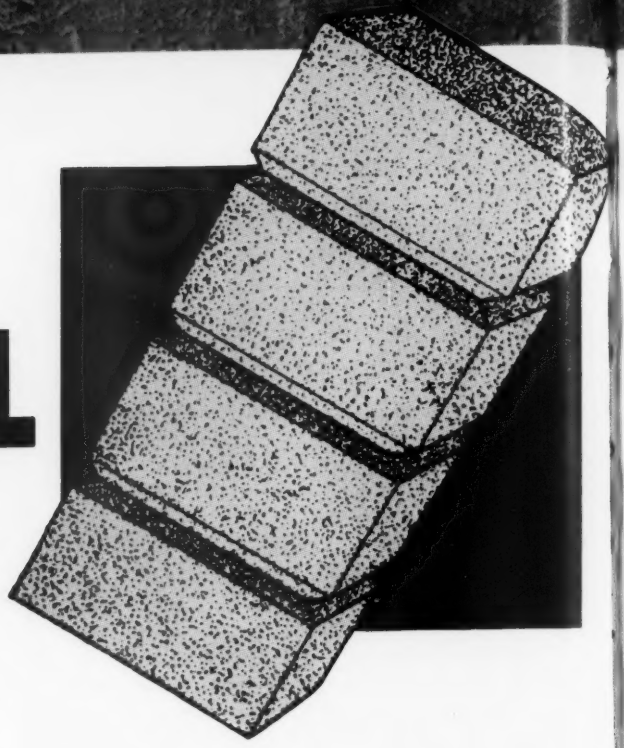
Famous

CORNELL FLUX

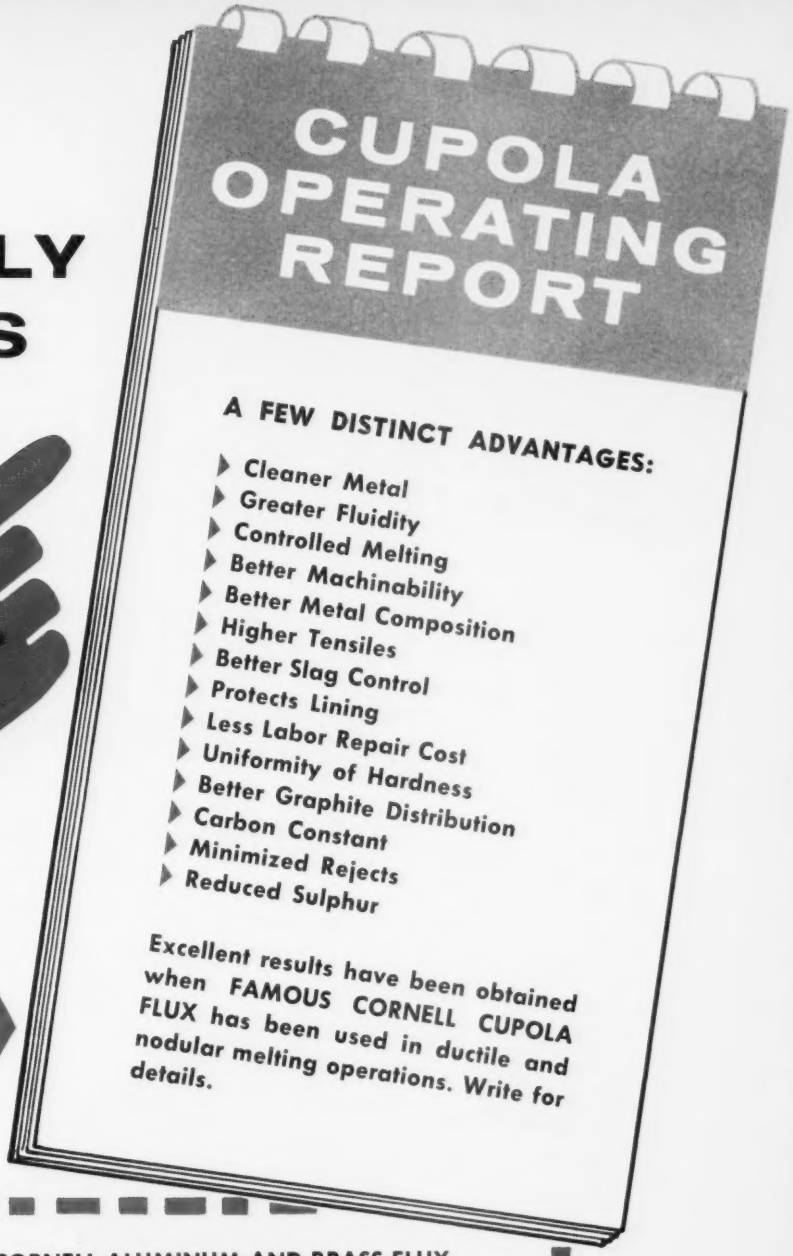
used in



GRAY IRON FOUNDRIES
and MALLEABLE FOUNDRIES
with CUPOLAS...

HERE

QUICKLY SHOWS UP



HERE'S HOW FAMOUS CORNELL ALUMINUM AND BRASS FLUX gives you 8 specific benefits

- Makes metal pure and clean.
- Permits use of more scrap without danger of dirt, porous places or spongy spots.
- Thinner, yet stronger sections can be poured.
- Metal does not cling to the dross.
- Crucible or furnace linings are kept clean and preserved.
- Cleanses molten brass even when the dirtiest brass turnings or sweepings are used.
- Saves considerable tin and other metals.
- Forms a perfect covering over the metal during melting, prevents oxidation and reduces obnoxious gases to a great extent.

Write for Bulletin 46-A

The CLEVELAND FLUX Company

1026-40 MAIN AVENUE, N. W. • CLEVELAND 13, OHIO

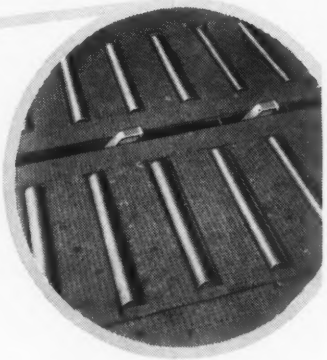
Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918

FAMOUS CORNELL FLUXES

Trade Mark Registered

20,000 lb. Molds Now Handled Easily!

with an ALVEY-FERGUSON Engineered Conveying System



IN THIS modern foundry, heavy molds weighing from 15,000 to 20,000 lbs. are handled easily on an Alvey-Ferguson Heavy Duty Roller Conveying System with an air operated reciprocating pusher between the two lines of rollers. (See inset photo)

For handling molds, flasks and sand in *your* foundry a completely co-ordinated Conveying System engineered by Alvey-Ferguson will reduce worker's fatigue, lessen breakage, increase efficiency and production in the same space — and therefore reduce costs . . . An Alvey-Ferguson *Engineered* Conveying System quickly *pays for itself in savings!*

THE ALVEY-FERGUSON CO.

A-F

For a discussion of latest efficient handling methods—write today.

OF CINCINNATI

103 Disney St. Cincinnati, Ohio

SINCE 1901 . . . FIRST IN PRODUCTS HANDLING EQUIPMENT

customers, rather than merely sales. So often a sale turns out to be just a one-shot proposition. All of us want customers instead who come back again and again to create real sales volume. Many years ago a well known businessman summed this up by saying, "Salesmanship is selling goods which won't come back to customers who will come back."

Some of the methods used by a medium-sized hardware manufacturer to cement relations with customers and prospects include:

1. Encouraging retailers to relay customers' desires to the home office. These public attitudes are important.
2. Advertising—we won't dwell on that here except to say that it is indispensable.
3. Establishment of a customer service department.
4. Studying buying habits of the public.
5. Handling correspondence, bills, complaints, etc. in a manner calculated to satisfy customers.
6. Teaching telephone courtesy throughout the organization.

In general, we can sum up relations with customers and prospects by saying you should make it convenient for people to buy from you, while at the same time giving plenty of thought to both quality and price.

Consider the Stockholder

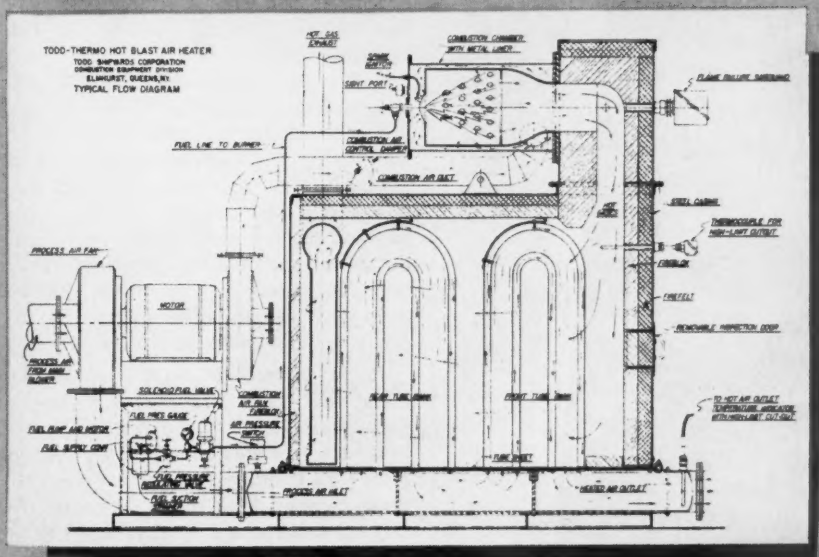
Of course we can't overlook our fourth area of public relations—the stockholders. We must not forget that stockholders are not only people —they are also customers. Recent surveys have shown that the typical American stockholder is not the cartoonist's idea of a capitalist wearing a top hat as depicted in the comic strips; he is just the average citizen with whom we associate every day. He is the butcher, the baker, the candlestick maker with a few dollars invested in corporate stock. The job of the corporation is to give its stockholders a pride of ownership in the organization as well as a sense of "belonging."

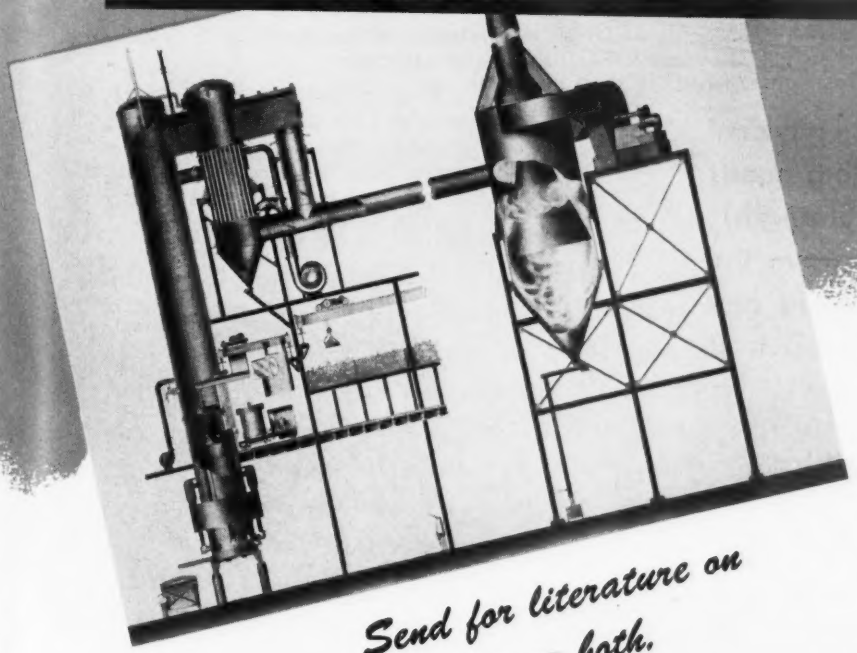
I have a friend who owns ten shares of stock in a national chain of tobacco shops. He is intensely proud of the fact that he owns a very small part of the organization —so proud, in fact, that he often goes several blocks out of his way just to purchase a carton of cigarettes from one of its branch stores. He admires the management of the corporation and backs it up by being a customer as well as a stockholder. In addition he is a self-appointed public relations man who spreads the gospel for "his company" at every opportunity.

NOW

a full range of HOT BLAST service

. . . MADE POSSIBLE WITH OUR APPOINTMENT AS EXCLUSIVE AGENTS FOR TODD-THERMO HOT BLAST HEATERS IN THE FOUNDRY INDUSTRY





TODD NEW YORK U.S.A.

Direct-Fired

TODD-THERMO Hot Blast Heater, utilizing gas or oil for fuel, employs a floating type exchanger section, composed of two or more banks of "U" or hairpin staggered tubes. Front bank of tubes, at which point the severe (highest) inlet temperature is encountered, is made of especially selected alloy metals.

Compactness and Efficiency

are reflected in TODD-THERMO Hot Blast Heaters which, in a few minutes, will heat pure uncontaminated air, of any foundry required volume, up to 1000° F., at small operational cost, with practically no maintenance.

Grindle

. . . Recuperative

GRINDLE RECUPERATIVE Hot Blast, utilizing waste gases from the cupola, is normally used in conjunction with dust collecting equipment. The cupola is capped, converting the upper section of stack into a combustion chamber in which the waste gases are ignited.

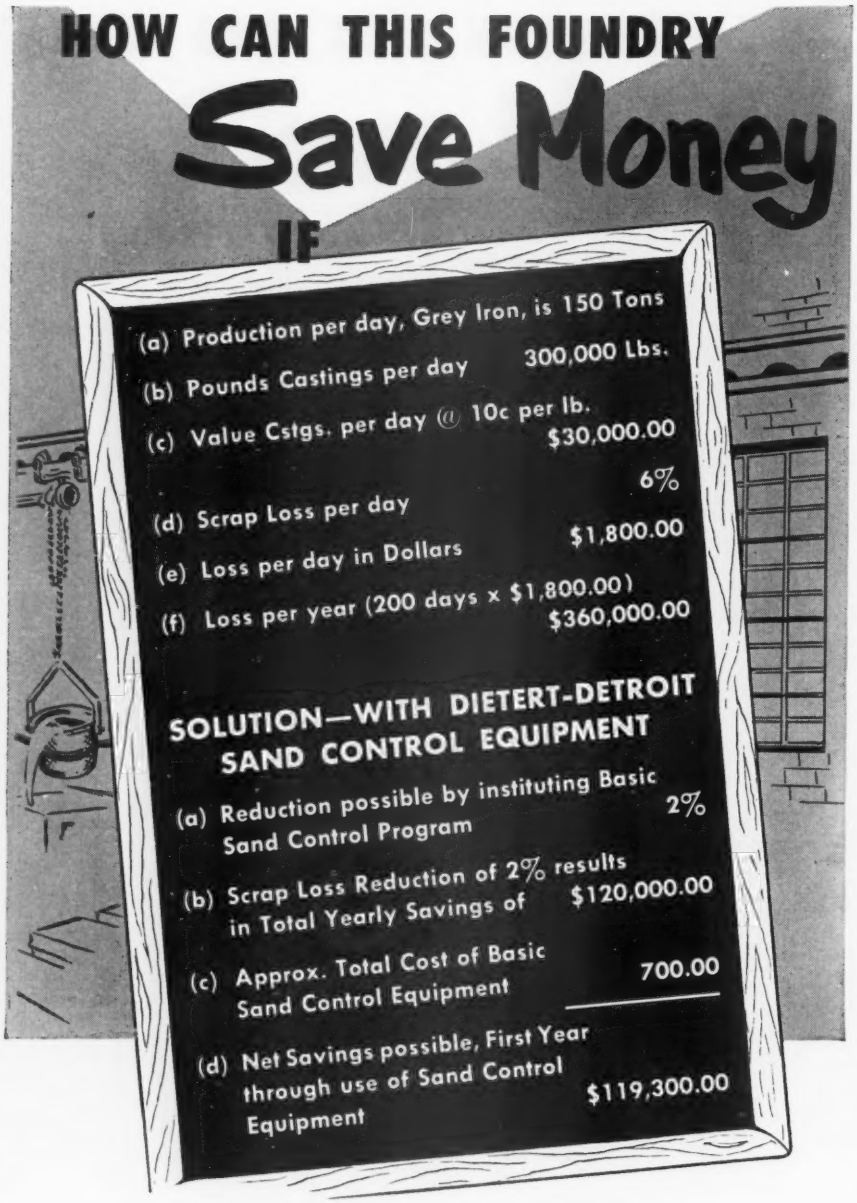
Resultant heat is drawn vertically downward through a single-pass heat exchanger. Much of the coarse particulate matter drops out in this unit and is collected in the bottom cone. Waste gases then pass on to the selected type of collector . . . electrostatic precipitator, baghouse, or Vortex.

EITHER TODD OR GRINDLE ENGINEERS ARE AVAILABLE FOR CONSULTATION WITHOUT OBLIGATION.

Send for literature on either, or both, today!

GRINDLE CORPORATION

15401 PARK AVE., HARVEY, ILLINOIS


HOW CAN THIS FOUNDRY
Save Money
IF
(a) Production per day, Grey Iron, is 150 Tons
(b) Pounds Castings per day 300,000 Lbs.
(c) Value Cstgs. per day @ 10c per lb. $30,000.00
(d) Scrap Loss per day 6%
(e) Loss per day in Dollars $1,800.00
(f) Loss per year (200 days x $1,800.00) $360,000.00
SOLUTION—WITH DIETERT-DETROIT SAND CONTROL EQUIPMENT
(a) Reduction possible by instituting Basic Sand Control Program 2%
(b) Scrap Loss Reduction of 2% results in Total Yearly Savings of $120,000.00
(c) Approx. Total Cost of Basic Sand Control Equipment 700.00
(d) Net Savings possible, First Year through use of Sand Control Equipment $119,300.00

Control the three fundamental physical properties of foundry molding sands (Moisture, Permeability and Strength). Reduce scrap losses and improve the quality of castings produced in any foundry with the help of Dietert-Detroit Sand Control Equipment.

REFERENCE—"Tools for Control" published by the Harry W. Dietert Co. Copies available upon request.

HARRY W. Dietert COMPANY

CONTROL EQUIPMENT
SAND · MOLD · MOISTURE
CARBON · SULFUR

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In ever-increasing numbers corporations are striving to attract and retain stockholders like my friend by educating stockholders in corporate problems and by letting them know just what is happening within the firm. This means that management must gain the active interest of its stockholders. Steps taken in this direction by a well-known soap company include:

1. Welcome letters to new stockholders.

2. Transmission of frequent and informative literature on corporate activities.

3. Annual reports which are not merely a maze of figures. The annual report can be humanized to tell a simple, forceful story of the year's activities. It need not be dull, but through such media as pictures and graphs it can give a simple explanation of the financial condition of the corporation.

4. Personalized correspondence with stockholders.

5. An annual meeting which is so interesting that stockholders make a genuine effort to attend. In addition to having stockholders turn out to protect their investments, this firm builds attendance at meetings with demonstrations of products, luncheons, movies and other plans for increasing friendship of stockholders.

It can readily be seen from all we have said that management has a definite stake in the public relations program. Without this recognition no public relations program can succeed. Management must make its public relations programs a continuing process with each of the four areas mentioned above receiving its fair share of attention.

Keep a keen edge on all of the tools in your public relations kit; the publicity tool alone will not serve every purpose. Proper care and use of your public relations tools will save dollars in the long run.

"Can it be payday . . . that's about the only time he hurries like that!"

FOSECO®

world-wide service eliminates foundry problems

For over twenty-four years FOSECO products and services have been helping foundrymen solve and eliminate foundry problems. Many specialized products have been developed by FOSECO laboratories, all of which have played a major part in the growth and advancement of the foundry trade. Wherever metals are melted and cast, in foundries and refineries all over the world, FOSECO products are available. There is a FOSECO product for every foundry need and for every type of metal.

here are a few typical FOSECO *products:*

- **FOR ALUMINUM ALLOYS —**

  Coverals — Covering and protecting fluxes for aluminum alloys.

  Degasers and Nucleants — For removal of harmful gases from aluminum melts and for refining grain size of the metal. Grades giving separate degassing, grain refining or a combined action are available.

- **FOR COPPER BASE ALLOYS —**

  Cuprits — Covering and protecting fluxes for use on copper and yellow brasses.

  Cuprex — Covering, cleansing and degassing compounds for red brasses and nickel alloys.

  Albrals — For removing oxide and other inclusions from high tensile brasses.

  Regenerators — For cleaning and degassing copper and nickel alloys.

  Deoxidizing Tubes — For deoxidizing and increasing the fluidity of copper and nickel alloys.

- **EXOTHERMIC FEEDING COMPOUNDS FOR ALL METALS —**

  Feedex — A range of moldable exothermic compounds (covered by U. S. Patent No. 2,591,105) which greatly reduce the riser volume, and increase casting yield. Also helps correct unfavorable temperature gradients and insures progressive solidification of the casting or ingot. Grades are available for all metals and alloys.

  Ferrux and Feedol — A complete range of riser covering compounds for ferrous and non-ferrous alloys. Both insulating and exothermic, these compounds give increased efficiency to conventional type risers and permit some reduction in riser height.

FOSECO® There are over 150 FOSECO products, covering every phase of foundry work, available in nearly every country in the world. FOSECO Technical Representatives cover almost forty countries, ready to give expert advice and assistance in foundry practice. Complete manufacturing plants are located in the United States, Canada, England, France, Germany, Italy, Austria, and South Africa. The American plant is now at a new, more central location in Columbus, Ohio, and representatives serving the entire nation are always available to help you solve your foundry problems. The Canadian plant is located in Guelph, Ontario.

FOUNDRY SERVICES, INC.
2000 Bruck Street, Columbus 7, Ohio

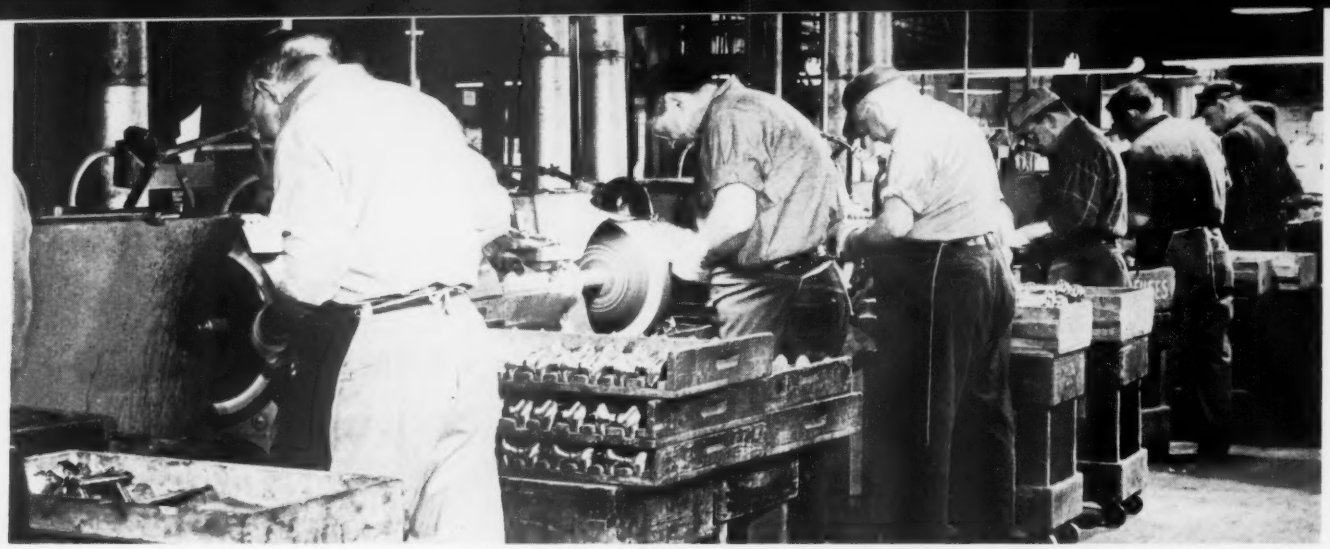


Fig. 1—At Union Brass & Metal Mfg. Co., St. Paul, brass acorn sink fixtures are ground and finished on backstand units. Production has been increased 67 per cent

Cleaning Nonferrous Castings

With Coated Abrasives

BY CONVERTING to coated abrasives for grinding, finishing and polishing castings, many nonferrous foundries have slashed unit costs as much as 300 per cent and increased production up to 65 per cent. In addition, they have created greater safety for cleaning room workers.

Using present equipment, with the addition of low-cost accessory items, a foundry can use coated abrasive methods. For a basic belt grinding unit—a backstand—the only equipment needed in addition to the present lathe is a contact wheel, an idler and abrasive belts. Backstand arrangements are flexible and can be fitted to available operational space.

One of the most important advances in coated abrasives for foundry use in recent years has been the introduction of resins for the adhesives which hold the abrasive mineral grains to the backing. Through this development, coated abrasives are more heat resistant, and today's resin bond constructions offer cooler cutting and faster operation, with longer belt or disc life.

Foundries using coated abrasive belts have noted increased safety because there is no jarring—and less tension—on the operator. Downtime has been reduced because it takes less than a minute to change a belt. Contact wheels, dynamically balanced, wear evenly over a long period of time and do not get out of balance. Finishes are more consistent, minimizing costly rejects.

Backstands are the most common type of machine used with coated abrasives in foundries, but several other types are employed when work is too large to be brought to the backstand or when surfaces are inaccessible to abrasive belts.

For pieces too heavy or too large to be moved, swing grinders easily can be moved to the work. These machines can be equipped for coated abrasive use by adding a contact wheel and an idler. For inside sur-

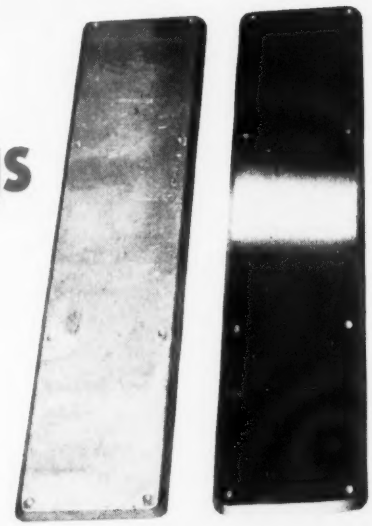


Fig. 2—Schlage Lock Co., San Francisco, has reduced the cost of semi-finishing bronze door-lock trim by one-third by using a grit 50 abrasive belt on a floor backstand unit

Fig. 3—With coated abrasive belts on backstands, risers and gates are ground from alumium castings for 3 cents per unit at Linmold Co., Los Angeles. Cost has been cut 300 per cent. Output is 210 pieces an hour

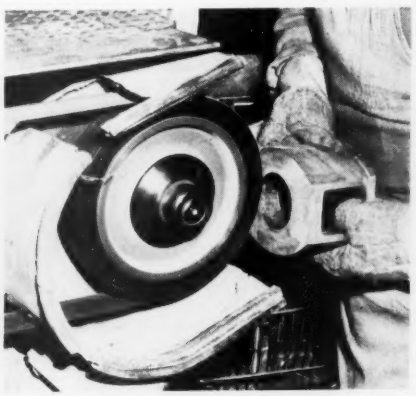


Fig. 4—Arcee Foundry, South Gate, Calif., is using abrasive belts on backstand grinders to snag aluminum parts for dental x-ray machines at a rate of 30 per hour. Unit cost has been cut 50 per cent, with less jarring and less tension on operator

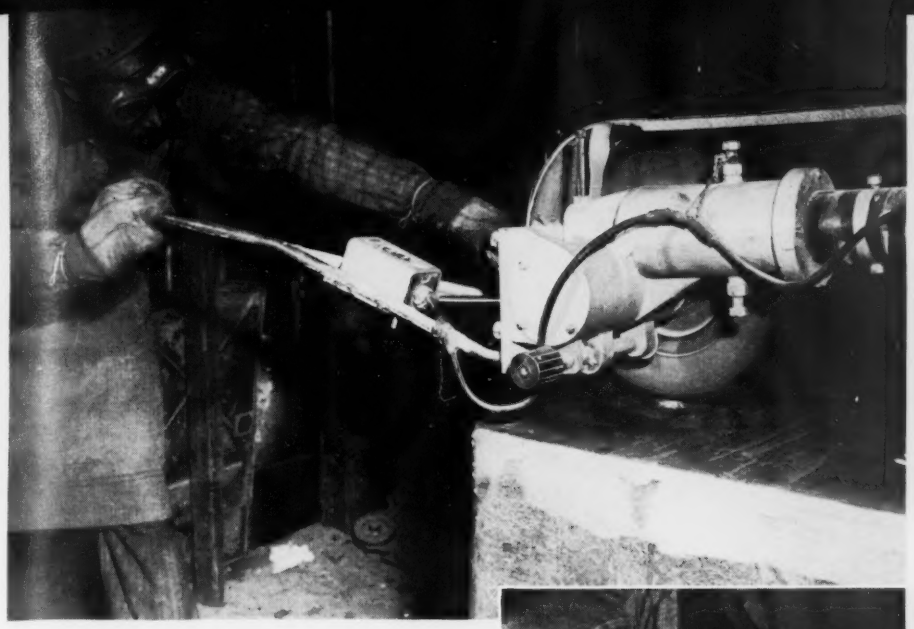


Fig. 5 (above)—A swing grinder fitted with a contact wheel and 36 grit belts has helped to increase production 50 per cent at Stamford Casting Co., Stamford, Conn. Belts are used to remove flashing from the outer surface of aluminum control boxes

Fig. 6 (right) — The firm uses grit 24 discs to remove flashing, burrs and nibs which cannot be reached by the swing grinder because they are on the inside portion of the boxes

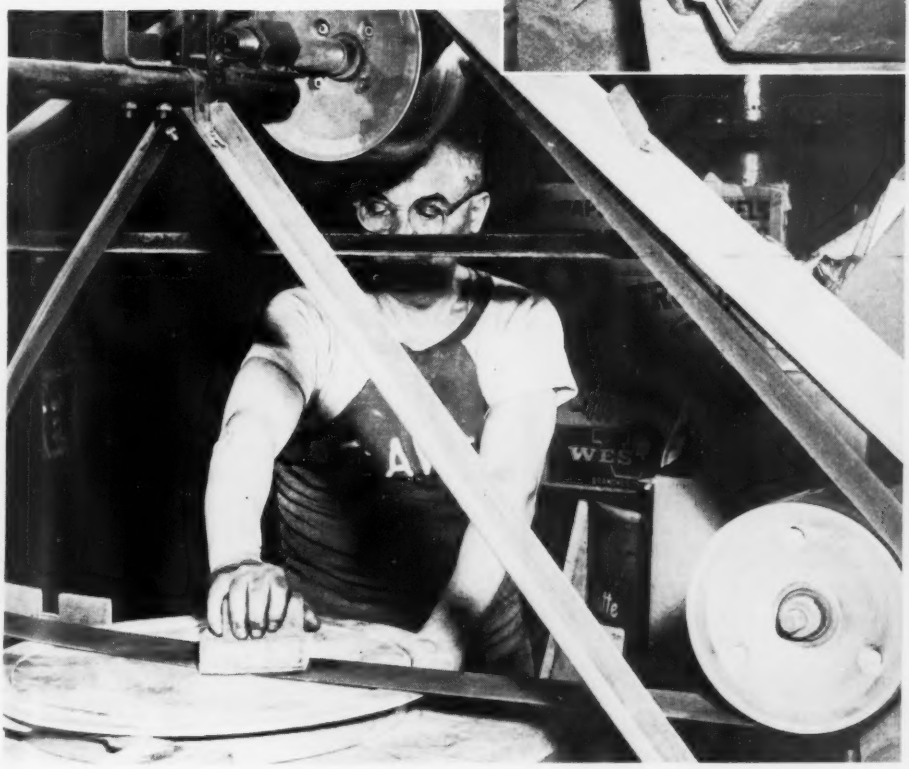
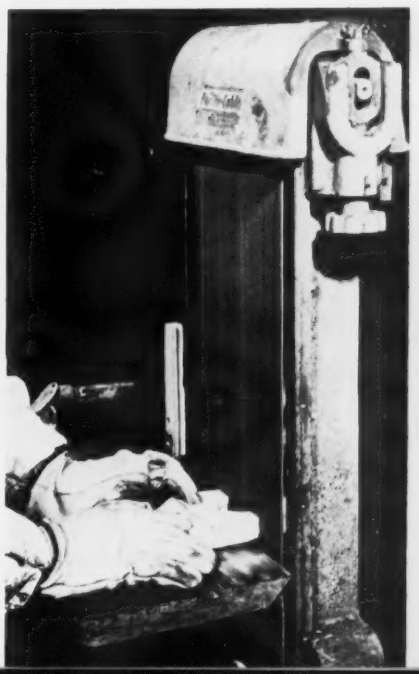


Fig. 7—A stroke sander with abrasive belts, grits 24 and 60, are used at Brown Brothers Foundry, Stamford, to grind and finish flat areas on aluminum garbage disposal unit covers. Production is up 50 per cent and finish is better

Fig. 8—DeSanno Foundry & Machine Co., Oakland, Calif., uses backstand units to grind gates, parting lines and flashings from brass ferrules, ells and tees. The firm reports a labor saving of from 25-30 per cent

Fig. 9 (below)—A platen sander is used to remove the parting line flash from magesium die castings at the foundry of Dow Chemical Co., Midland, Mich., and finishes about 35 more pieces per hour than was otherwise possible. Each grit 100 belt used has a life of about 800 pieces



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. . . highest quality
. . . uniform performance

For maximum metal temperatures with minimum coke per charge—specify Indianapolis Foundry Coke.

Always high in carbon content, always low in sulphur . . . . low in ash . . . . uniform carbon absorption.

And because its structure is carefully controlled, Indianapolis Foundry Coke resists breakage.

Four sizes—top and bottom limits 1" —to fit your cupola operations. Specify Indianapolis Foundry Coke for top performance.

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Established 1890

faces, corners and other places where belts can not easily be used, coated abrasives on portable disc grinders or flexible shaft grinders are doing the job with little effort on the part of the operator.

Throughout the nonferrous foundry industry, three basic machines which have been converted to coated abrasives—the lathe, the swing grinder and the portable disc grinder—are in popular use, in addition to other machines which were developed especially for coated abrasives, such as the stroke sander and the platen sander.

Case history reports from the field show that these machines and coated abrasives are grinding, finishing and polishing an array of nonferrous metal castings in many shapes and sizes. The accompanying illustrations, supplied by Minnesota Mining & Mfg. Co., St. Paul, show some typical examples of what coated abrasives are doing.

SBA Aids Business Financing

Small firms now can obtain information on financing through issuance of securities from regional and branch offices of the Small Business Administration. Under the recently announced program, the Securities and Exchange Commission will provide SBA with current information on regulations applying to the sale of such securities.

Book Review

Proceedings of the Institute of British Foundrymen, Vol. XLVII, 1954, cloth, 7¼ x 9¾ in., 424 pages, published by the Institute of British Foundrymen, St. John Street Chambers, Deansgate, Manchester 3, England.

This volume contains some 18 papers as well as the discussions presented at the 1954 annual meeting of the Institute of British Foundrymen, and 11 selected papers and discussions presented at various branches of the Institute during the year. In addition it contains the annual report, report of Technical Council, the presidential address by John Bell, and the Edward Williams lecture by Prof. A. W. Scott on "Engineering Research Methods and Casting Problems."

Papers presented cover a wide range of topics dealing with the cupola, whiteheart malleable iron, steel castings, pinholing in brass and bronze, shell molding, exothermic materials, permanent molding, welding of spheroidal cast iron, feeding and running of castings, etc. Numerous illustrations enhance the presentations.

Photo Courtesy Ideal Castings Co.

SAVES $24,000 with ALLEN SHOVEL on Clark fork truck!

IDEAL CASTINGS COMPANY of Albion, Michigan, specializes in gray iron and alloy iron squeezer castings. In twenty-eight months, its $3,700 investment in a 2000-pound capacity ALLEN-equipped Clark fork truck has resulted in a $24,000 saving in direct wages alone! How's that for a return on your investment?

What's more, where it was formerly impossible to keep men on the job long enough to pay out, the same man has now been on the job more than two years—and likes it—thanks to the ALLEN-equipped fork truck.

The shovel-equipped truck is used eight hours a day—moving sand for the production molders, cleaning up after shake-out, bringing in clay, sand and fire brick, cleaning up refuse around the cupola, handling castings, loading and unloading highway trucks. On the rare occasions when the regular forks are used, the change-over—shovel-to-forks-to-shovel—takes less than 15 minutes, another ALLEN advantage. Maintenance? Says Maintenance Superintendent Maurice Cuyler: "Very little. Shovel and truck are still in good shape."

Smart foundrymen know their success depends on cutting costs—and smart foundrymen like President Lyle M. Johnson of Ideal Castings Company know from experience that an ALLEN shovel is a real cost cutter!

Take the first step toward savings that will put you in a better competitive position—send for details on ALLEN SHOVEL attachments—you can't buy better!

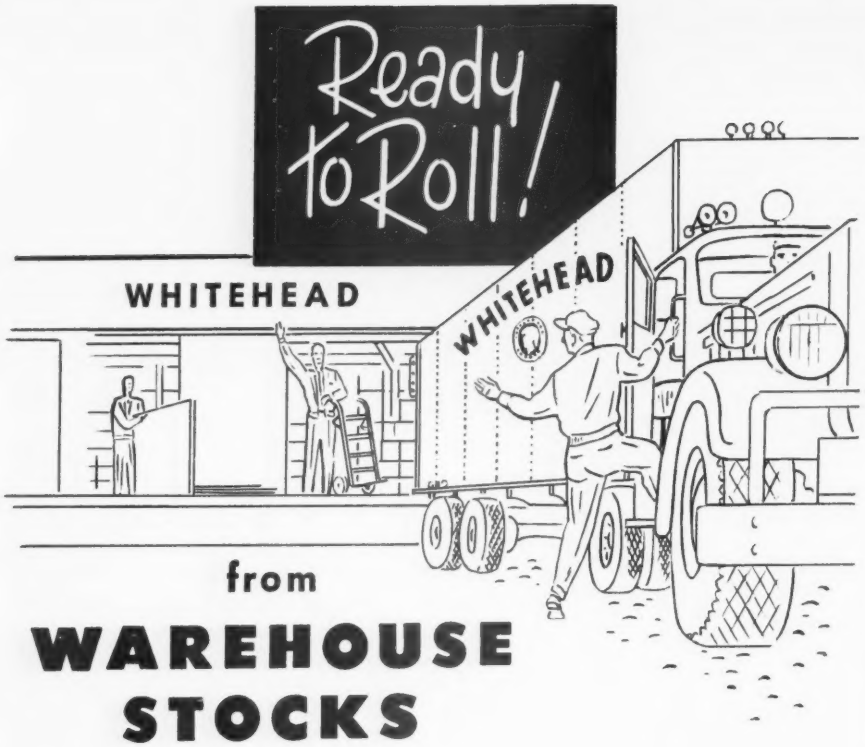
ALLEN INDUSTRIAL PRODUCTS, INC.
BATTLE CREEK, MICH.

America's foremost designers and builders of shovels, snow plows and cabs for industrial trucks.

ALLEN INDUSTRIAL PRODUCTS, INC.
LIBERTY STREET, BATTLE CREEK, MICH.

☐ Send complete shovel attachment details.
☐ Send representative.

Name..... Title.....
Company.....
Street..... City..... State.....
Specify make and model of truck.....



from

WAREHOUSE STOCKS

Nickel
Ductile Iron Additives
Iron Foundry Inoculants
Vanadium
Chromium
Silicon
Manganese

A supply of these, the principal foundry alloys of The International Nickel Co. and Vanadium Corporation of America, can be ready to go from our warehouses to you at almost a moment's notice. Our network of warehouses is well-stocked with these materials in all standard sizes and meshes. Immediate "off-the-shelf" shipment is not just a promise with us—it's a reality. And, you'll find our prices are right too. Why not call us for a quotation?

And, while you have Whitehead on the phone, take advantage of our technical service department. Our foundry engineers will be happy to answer any questions you may have on alloying problems, or otherwise work with you in any way they can.

For higher quality castings, use higher quality alloying materials. And get them fast—Call Whitehead.

WHITEHEAD
METAL PRODUCTS COMPANY, INC.

303 West 10th Street · New York 14, N. Y.

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Obituary

HENRY S. WASHBURN, chairman of the board, Plainville Casting Co., Plainville, Conn., died Mar. 31, in Florida. A native of Brooklyn, N. Y., Mr. Washburn attended Yale University and was first engaged in banking and railroad positions, later becoming associated with H. B. Claflin Co., and Butler Bros., New York. In 1917 he became purchasing agent, Turner & Seymour, Torrington, Conn., and in 1921 was named president and treasurer of Plainville Casting Co. He retired from his position as president of that organization early this year.

HENRY S. WASHBURN

Active in foundry technical association work, Mr. Washburn was a member of the administrative council of the National Foundry Association from 1937 to 1939. A former director of Gray Iron Founders' Society, he received its award for distinguished service to the industry in 1946. He served as director and vice president of the American Foundrymen's Society, and became president of the organization in 1939. In 1947 he received the Joseph S. Seaman Gold Medal of the AFS for outstanding service to the association and valuable contributions to the gray iron casting industry.

* * *

Magnus Neshiem, 66, who was associated with the foundry industry for over 40 years, died Mar. 3 in Troy, N. Y. A native of Norway, he began his foundry apprenticeship there, resuming foundry work after arriving in the United States in 1912. He was associated with Phoenix Mfg.

Juniata

TRADE MARK REGISTERED

The UNIVERSAL FOUNDRY SAND

JUNIATA Bank Sand is by nature adaptable to the most essential physical requirements of an ideal foundry sand. Good grain distribution, high surface tension and excellent heat resistant properties.

JUNIATA Bank Sand is produced under strictest quality control. Selection of each customer's shipment is made with the determined purpose of duplicating previous shipments, thus ensuring every user a high degree of uniformity.

JUNIATA Bank Sand deposits encompass a wide range of grains. Careful choice of that grade best suited to our customers' requirements is the number one purpose of the personnel entrusted with this important service.

MOLDING SANDS
CORE SANDS
SILICA SANDS
SHELL SANDS
BLAST SANDS
BENTONITES
BONDING CLAYS
WOOD FLOUR
FIRE CLAYS
SHOT AND GRIT
MALLEABRASIVE
ABC COKE
REFRACTORIES

GREAT LAKES FOUNDRY SAND CO.

UNITED ARTISTS BUILDING, DETROIT, MICHIGAN

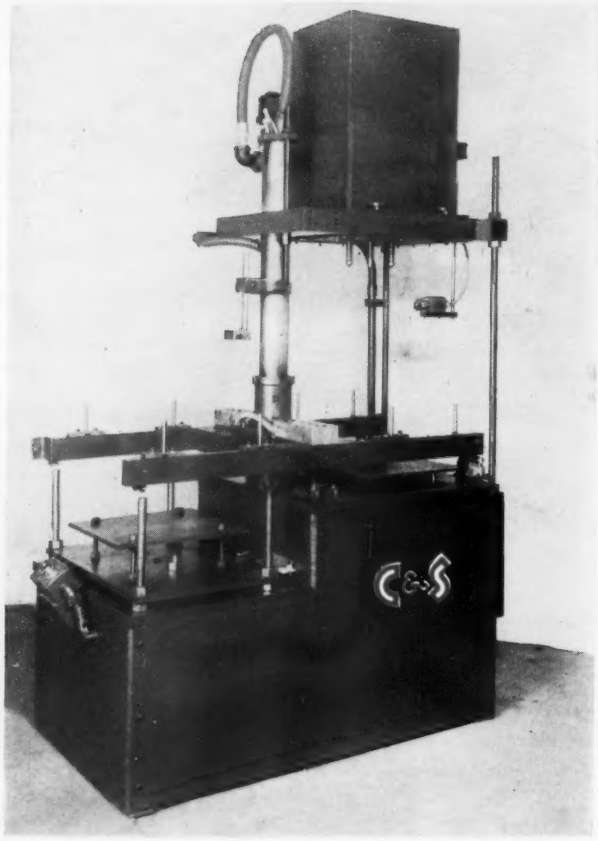
It's NEW! ▶ ▶ ▶

tomorrow's shell machine is here TODAY.. designed to give foundrymen high production of

SHELL CORES

and

SHELL MOLDS



New Bulletin CS-15 describes

ALL-NEW UNIVERSAL "BLO-CORE" SHELL MACHINE, featuring:

- Two station operation . . . core box sizes up to 15″x20″x30″ high...patterns up to 15″x20″x14″
- Finished Shell Cores, Molds, every 20 seconds.
- Eliminates core driers and ovens.
- Fully Automatic or Semi-Automatic Operations.
- Universal Blow Head up to 20 lbs.
- Makes Shell Cores, Molds Vertically, Horizontally, Together or Separately.

No other shell machine is so flexible

See it NOW . . . Call or write for Bulletin CS-15

C&S PRODUCTS COMPANY

14841 MEYERS RD., DETROIT 27, MICHIGAN

Phone: BR-3-1680

Co., Eau Claire, Wis.; Western Iron Foundry Co., Wichita, Kans., and in 1936 was appointed superintendent of the iron foundry, Ludlow Valve Mfg. Co. in Troy. While there he returned to Norway to study foundry conditions and methods. Most recently he was associated with Watervliet Arsenal, Watervliet, N. Y., but retired in January.

* * *

Robert F. DeSha, 84, a molder with the former Chattanooga Roofing & Foundry Co., Chattanooga, Tenn., until his retirement died Mar. 3. He spent 25 years in the company's molding department.

* * *

George H. Woody, 52, sales manager for the Indianapolis Dodge plant, Link-Belt Co., Chicago, died Apr. 3, in Indianapolis. Mr. Woody had been associated with the company since 1924.

* * *

Walter A. Fletcher, for 14 years sales manager of the Western division, E. F. Houghton & Co., Philadelphia, died Apr. 4, in San Francisco. He had been engaged in company sales work since 1922.

* * *

Frederick J. Vlaskamp, 53, president, Fenton Foundry Supply Co., Dayton, O., died Feb. 17.

* * *

William J. Heatley, 66, president, Federal Malleable Co., Milwaukee, died recently in St. Petersburg, Fla.

* * *

Clarence R. Shank, 57, general superintendent, Valley Mould & Iron Corp., Chicago, died Mar. 12.

* * *

Charles T. Binks, 67, vice president, Mooney Iron Works Co., Cleveland, died there Mar. 5.

* * *

G. Stomps Gauthier, 52, co-owner, Queen City Foundry & Machine Co., Buffalo, died Jan. 31.

Old Timers Form Metals Club

Los Angeles area executives who have spent 25 years or more in the metal-working industries have formed a club for the purposes of fellowship and reminiscing. The organization, Quarter Century Metals Club, has over 120 members. Among the directors of the club are Robert Gregg, foundry manager, Reliance Regulator Division, American Meter Co.; Lloyd D. Kay, president, Kay-Brunner Steel Products Inc.; J. C. Meyer, general partner, Snyder Foundry Supply Co.; J. D. Spalding, works manager, National Supply Co. and C. B. Tibbetts, president, L. A. Steel Casting Co.

We Invite You to try "SUPERFLAKE"* FOUNDRY PRODUCTS

Please check the products which interest you, fill in the coupon and we will be glad to send you samples of our GOOD foundry products.

CHECK HERE

	"MOLDUKO"* CORE & MOLD WASH Produces smooth castings—Stops "burning in"—Airdries Will ship **10 Gals. of Molduko & 25 lbs. of Filler** at full drum prices for test purposes.
	HYDRO GRAPHITE *(It's New!)* Excellent permanent mold wash.
	"CARBON-RAISER"* (Add to the metal in the ladle, at the spout, in the furnace or in the cold charge) **IRON FOUNDRIES** use to control depth of chill and improve the machineability of the castings. **STEEL FOUNDRIES** use to control carbon content, in the ladle and in the furnace quickly, accurately and efficiently.
	PARTING (DRY or LIQUID) Non Silica or Tripoli, Highest Quality
	PIPE REDUCER Used on "Gates" and "Risers" in Steel & Iron foundries.
	PLUMBAGO & CORE WASHES In both Dry and Paste forms.
	LADLE WASH
	MUDDING COMPOUNDS
	CORE PASTES Strong bond, Dry quickly.

* *These trade marks Reg. U.S. Patent Office.*

PLEASE SEND SAMPLES AND INFORMATION ON THE PRODUCTS CHECKED.

Name ..... *Title* .....

Company .....

Address .....

SUPERFLAKE GRAPHITE PRODUCTS

SUPERIOR GRAPHITE COMPANY

Manufacturers of mold and core washes, facings parting compounds, core paste, carbon-raiser.

TELEPHONE: RANDOLPH 6-7939

33 So. Clark Street *Chicago (3) Ill.*

PRODUCES BETTER CORES! James B. Clow & Sons reports: Uniform electronic baking eliminates stresses and subsequent surface cracks or dimensional instability. Cores won't sag, don't require reinforcing rods. Surfaces are smoother and harder. Their cores range in size from ½ ounce to 400 pounds

STREAMLINES FLOW! Boose Aluminum Foundry, Reamstown, Pennsylvania, has increased coreroom output 33% per manhour. Cores move continuously from maker through their two 15 kw THERMEX units in tandem. No storage required. Minimizes handling. Cores from ½ ounce to over 20 pounds can be baked simultaneously. Rejects are practically nil.

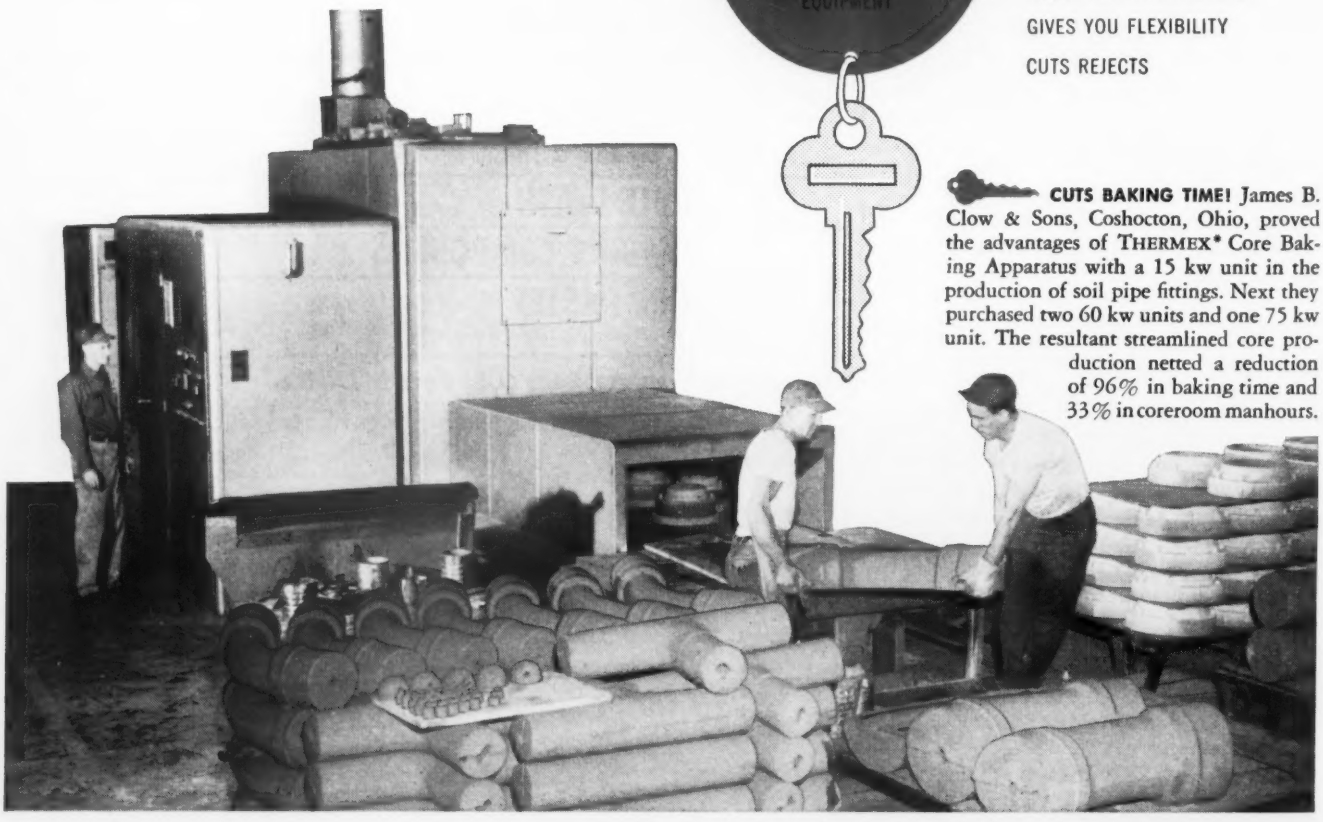
How to open the coreroom door to

LOWER COSTS

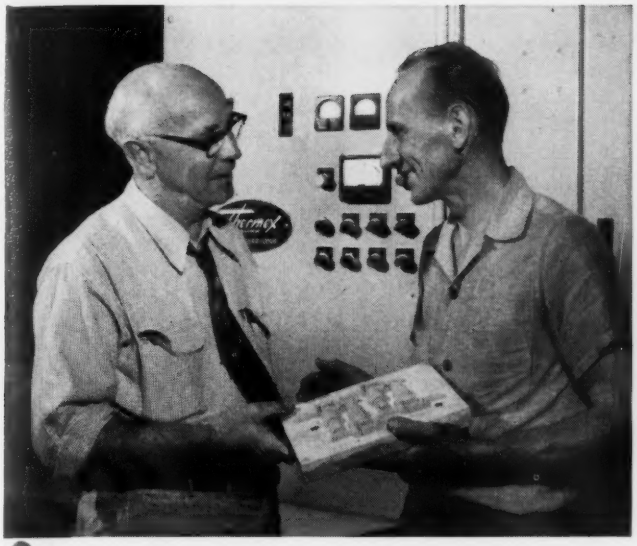
Modernize with Thermex

ELECTRONIC CORE BAKING EQUIPMENT

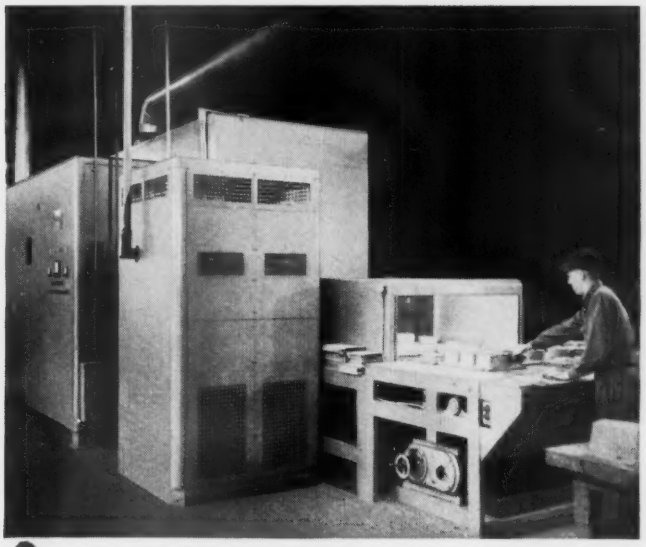
CUTS BAKING TIME
PRODUCES BETTER CORES
STREAMLINES FLOW
IMPROVES WORKING CONDITIONS
REQUIRES FEWER DRIERS
GIVES YOU FLEXIBILITY
CUTS REJECTS



CUTS BAKING TIME! James B. Clow & Sons, Coshocton, Ohio, proved the advantages of THERMEX* Core Baking Apparatus with a 15 kw unit in the production of soil pipe fittings. Next they purchased two 60 kw units and one 75 kw unit. The resultant streamlined core production netted a reduction of 96% in baking time and 33% in coreroom manhours.

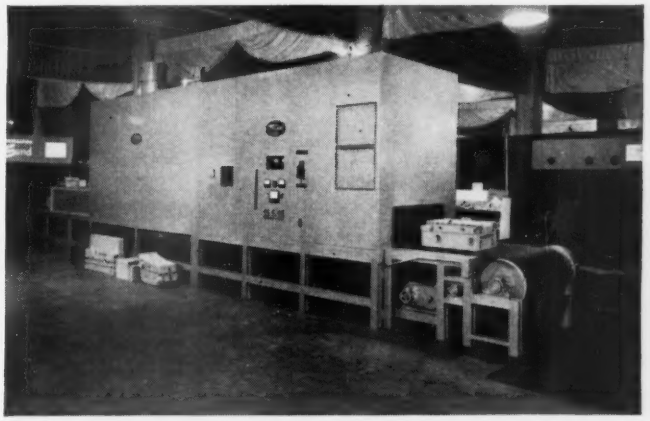


REQUIRES FEWER DRIERS! At Repcal Brass Manufacturing Co., Los Angeles, a THERMEX Core Baking Unit enables one shift to produce more cores than two shifts with conventional baking equipment. Now, 35 driers produce 4500 cores continuously; formerly, 400 driers produced 1600 cores. Total estimated savings per year: $10,000.



IMPROVES WORKING CONDITIONS! At Frick Company, Waynesboro, Pennsylvania, a 60 kw THERMEX Core Baking Unit has replaced ovens. Working conditions have been greatly improved . . . no smoke or oven heat. Cores' quality has been improved. Production is faster, more flexible . . . used for about 20,000 different castings.

CUTS REJECTS! At United Foundries Co., Wyoming, Pennsylvania, a 15 kw THERMEX Core Baking Unit has been in operation more than 20,000 hours with only routine maintenance. Here, critical inspection formerly rejected 10% to 40% of all cores. Now 99% of the electronically-baked cores are perfect.



GIVES YOU FLEXIBILITY! New 75 kw THERMEX Electronic Core Baker has exclusive Tunnel Circuit for cores varying in height as much as five to one. This affords great flexibility for coreroom speed and economy. Continuous production with THERMEX units permits baking special runs at all times in a matter of minutes!

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A DIVISION OF NATIONAL CYLINDER GAS COMPANY

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Please send copy of Electronic Core Baking booklet and Data Sheet.

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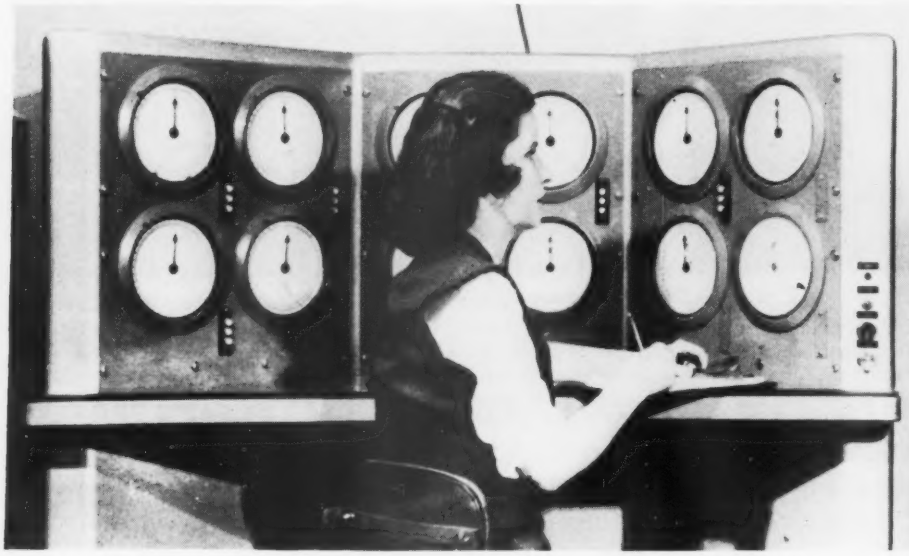
City _____ *Zone* _____ *State* _____

My Name _____

My Position _____

By C. A. HENNESSY
Manager, Commercial Sales
Lamson Corp.
Syracuse, N. Y.

Mechanized Office Paper Handling



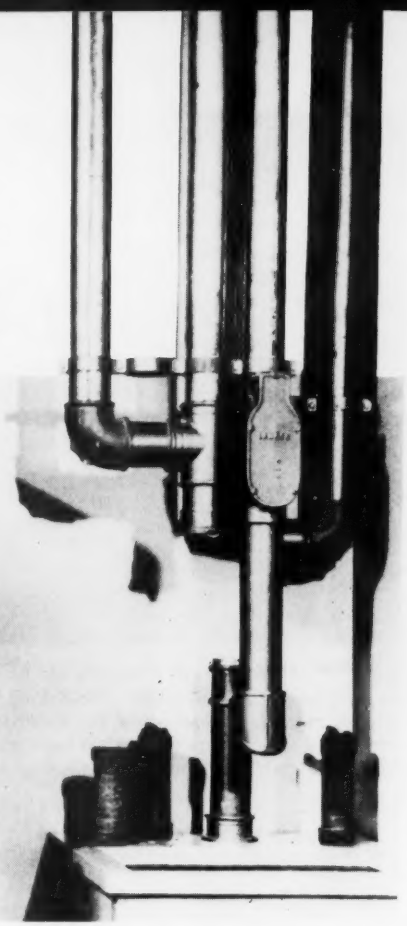


Fig. 1—In the laboratory, the spectrographic examination of the metal sample sent by tube is made quickly

THE flow of papers is the official means of communication in our industrial system. It is a paperwork society. Paperwork is like an iceberg—only the top one-eighth is visible. Receiving tickets, bills of lading, and factory papers often do not reach the executive offices, but these, and hundreds of other cards, forms, bills, tickets, slips, blueprints, cash, stamps, and checks make up the submerged seven-eighths of the iceberg. The submerged parts, out of sight and often out of mind, many times can be melted down and made to yield big savings.

Step one in the attack is an analysis of the flow of paperwork: What it is, where it generates, where it goes, and what it finally is stored in. This investigation is likely to turn up a variety of forms, invented expediently and perpetuated expensively. For example, Lamson Corp. found that it had 23 different kinds of envelopes addressed to the home office. A study of how new forms start usually will show how form control can be instituted by a company, with inspection of reorders for printing forms before they become established.

A helpful technique is to make a paperwork "roadmap." With a crayon and a roll of wrapping paper, trace a typical order through every paperwork step it encounters. At each paper processing point, paste onto the wrapping paper all the forms that are used. Note some of the distances that the paperwork has to move.

Step two in the reduction of paper handling costs is to justify them. One leading work simplifier has this approach: When he has to examine a clerical job, he seriously questions why it is necessary. Paperwork and paperwork handling can stand a lot of this.

Many paperwork records are kept simply as a record of when a piece of paper enters and leaves a department, kept merely as a defensive measure. The squirrel instinct is still strong. There are many people who keep, for 30 days, a copy of every memo sent.

The justifying process can start in the dim area to which records go when an order is closed out. Legal requirements, of course, must be met in record storage. But why not take the position that after the order is filled, keeping the record is a liability in that it costs money to store paper? Storage time for complete contract records can be cut to five years with a provision to extend for one additional year if the records are called out of file for any reason. Junking records takes a brave, bold man.

Step three is to organize the flow of paperwork. The analysis and justification of current paperwork will boil down the mass to its essentials. Organization often is a matter of timing. Paper work moves as well as people move it. It's a question of

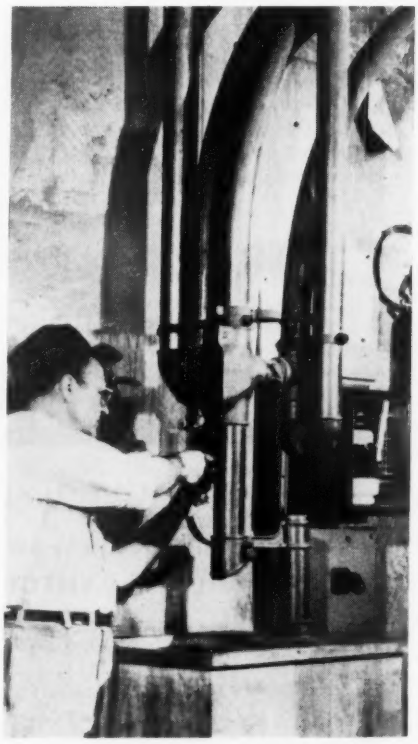


Fig. 2—To check a heat, a sample of metal is sent from the melting floor to the laboratory via pneumatic tube

FORD CLEVELAND FOUNDRY SAVES MONEY with K&R Core Wire Straighteners

Savings ranging from $75.00 to $150.00 a month are not unusual in foundries using K&R Core Wire Straighteners. Proof that these machines are widely recognized as substantial money-savers is seen in the partial list of K&R users at right. Further proof — scores of foundries, like the Ford Cleveland Foundry shown above, own up to 10.

Since a high degree of straightness is not ordinarily required by the average foundry, K&R straighteners are ideal, for they re-straighten core wire to a usable condition — over and over again — as long as it remains ductile. Machines are made in two sizes — DX-5 for wire 1/8" to 3/8" dia., and F-5 for wire 3/16" to 3/4" dia. Bulletin 58B contains all the facts. Send for it.

A few of the companies now using K&R Straighteners . . .

Allis-Chalmers Mfg. Co.
Aluminum Co. of America
American Steel Foundries
Bohn Aluminum & Brass Corp.
Bonney-Floyd Co.
Cadillac Motor Car Co.
Caterpillar Tractor Co.
Central Foundry, Div. of General Motors
Chevrolet-Saginaw Grey Iron Foundry
The Cooper-Bessemer Corp.—Mt. Vernon, Ohio
The Cooper-Bessemer Corp.—Grove City, Pa.
Crane Co.
Delco-Remy Div. General Motors Corp., Anderson, Ill.
Delco-Remy Div. General Motors Corp., Bedford, Ind.
Dodge Steel Co.
Farrel-Birmingham Co., Inc.
Ford Motor Co.—Windsor, Ont.
Ford Motor Co.—Cleveland, O.
Ford Motor Co.—Detroit, Mich.
General Electric Co.—Erie, Pa.
General Electric Co.—Everett, Mass.
General Malleable Corp.
General Steel Castings Corp.
Goulds Pumps Inc.
Hercules Foundry Div. U. S. Challenge Co.
Ingersoll-Rand Co.
International Harvester Co.
International Motor Co.
John Deere Tractor Co.
McKinnon Industries Ltd.
Minneapolis Moline Power Implement Co.
National Malleable & Steel Castings Co.
Oberdorfer Foundries Inc.
Ohio Steel Foundry Co.
Pacific Car & Foundry Co.
Packard Motor Car Co.
Pittsburgh Steel Foundry Corp.
Pontiac Motor Div. General Motors Corp.
Pratt & Letchworth Co. Inc.
Renault, France
Saginaw Malleable Iron Div. General Motors Corp.
Servel, Inc.
Societe Stein et Roubaiz
St. Louis Steel Casting Co.
Stone & Webster Engineering Co.
Studebaker Corp.
Symington-Gould Corp. (The)
Worthington-Simpson Ltd.
Wright-Aero. Corp.

66 Years of Metalworking Experience Built into K&R Machines:

Cold Roll Forming Machines
Bending Rolls — Straightening Rolls
Crimping Machines
Slitting Lines — Flying Shears & Saws
Hydraulic Tube Benders
Hydraulic Bulldozers — Hydraulic Presses
Edging Machines
Special Metalworking Equipment

KANE & ROACH
INCORPORATED
Syracuse, New York
Established 1887

making little batches flow smoothly, of not having big batches, with the paper of the moment halfway down the high pile. Better scheduling permits an even flow, with the work done by fewer people.

All this moving around costs money, of course. The cost of handling material in production from the time it enters the plant until it is shipped as a finished product is approximately one-third the total cost of manufacturing. The costs of handling the accompanying papers must be of the same order. Organizing the flow is both possible and profitable.

Step four is to mechanize after the paperwork has been analyzed, justified and organized.

Studies will show the points of maximum paper generation and receipt. All the paper should be moved by relatively inexpensive messengers, but more often than not, it is moved by foremen who in the meantime neglect more important duties.

Many devices are manufactured which carry written communications from one point to another. They work and they pay off. They help convert nonproductive time to productive time. Telegrams and other important papers are no longer subject to delay, but are delivered immediately.

As a specific example of these mechanical messengers, consider steel mill and foundry melt testing. When a company is processing 25 tons of alloy steel, it has to check the heat. Here a metal sample, Fig. 2, is being sent via pneumatic tube from the melting floor to the laboratory, Fig. 1, for spectrographic examination. The check is made quickly. The mechanization of handling samples has paid off in increased furnace output and better control.

Mechanization of paper handling is one way to cut costs. It pays dividends. Mechanization, however, is only the fourth part of an over-all technique which can be summed up in these words: *Analyze, justify, organize, mechanize.*

Editor's Note: Condensed from a paper presented at the Fifth Biennial Materials Handling Conference, sponsored by Westinghouse Electric Corp. at Columbus, O., Feb. 1-2, 1955.

Pipe Institute Elects Officers

Cast Iron Soil Pipe Institute has re-elected its officers for another term in 1955. President is Frank T. Hamilton, head of Anniston Soil Pipe Co., Rudisill Foundry Co. and Emory Pipe & Foundry Co. all of Anniston, Ala. Vice president is Philip J. Faherty, vice president of Buffalo Pipe & Foundry Co., Buffalo. Treasurer is Deems W. Hallman, manager of Hajoca Corp., Lansdale, Pa. Homer E. Robertson, Washington, was re-appointed executive vice-president of the group. M. J. Harvey, Tyler, Tex.; L. Worth Little and Joe H. King III, both of Anniston, Ala., were elected for two-year terms as institute directors.

Pamphlet Outlines Ways to Provide Steady Employment

Ways for businessmen to provide steadier employment are outlined in a new pamphlet issued by the United States Chamber of Commerce. The booklet shows savings that can be made in unemployment taxes by increased job stabilization. Questionnaires which help the employer assess his firm's job stabilization policy and improve it are found in the pamphlet, "Steadier Jobs." Copies are 25 cents and may be obtained from the Economic Research Department, Chamber of Commerce of the United States, Washington 6.

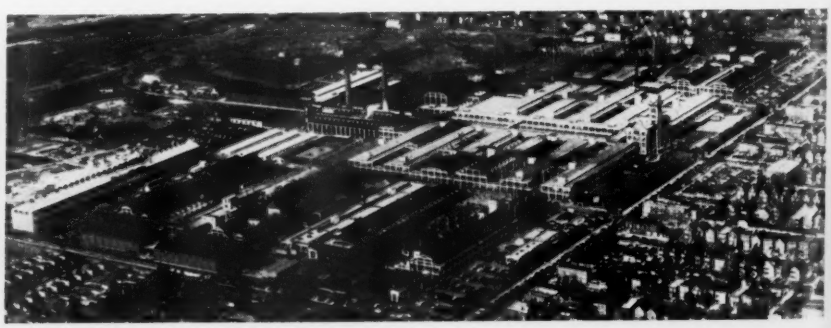
Crane Co. Marks 100th Year

ON JULY 4, 1855, Richard T. Crane poured the first castings in the R. T. Crane Brass & Bell Foundry, Chicago, an 18 x 24-ft shop he had built with his own hands. Today, in Crane Co.'s centennial year, the firm employs 12,000 persons in 14 plants and 150 branches in the U. S. A., Canada and England.

Richard Crane's first products were brass couplings, used to connect lightning rods, and copper lightning rod points. Now the company manufactures valves, fittings, fabricated piping and piping accessories, plumbing fixtures, plumbing brass trim, heating equipment, kitchen cabinets and accessory equipment for aircraft. In addition, through its subsidiary, Cramet Inc., Crane has received a government contract for production of titanium sponge and ingot and is constructing a plant at Chattanooga, Tenn., which is to be dedicated this year.

Crane Co. first established an engineering department about 1890, when R. T. Crane hired a metallurgist to assure production of uniform iron of 20,000 lb tensile strength. Before then, in 1888, Mr. Crane had realized that research would create better products and had established a chemical laboratory. Today the company's engineering division, established in 1937, occupies an entire building at the Chicago works and employs over 300 engineers.

New machinery has been added steadily to revitalize the company's manufacturing operations. In 1953 one of the most modern malleable foundries in the nation went into operation in Chicago (see FOUNDRY, Dec., 1953, p. 154), and in 1954 a new boiler foundry was opened at Chattanooga.



The 14 x 24-ft frame building on the left stands in sharp contrast to the 160 acres of manufacturing plants called the Chicago Works of Crane Co., only one of many of the firm's manufacturing operations today. The original frame brass and bell foundry was built by Richard Crane in July, 1855

WHEELABRATOR®

Continuous tumblast

Castings flow through the Continuous Wheelabrator Tumblast on a high production basis. No down time for loading or unloading.

brings Automation to the cleaning room

GIVES AUTO SPECIALTIES MFG. CO. AUTOMATIC, HIGH-VOLUME CLEANING

ix years ago — before anybody called it automation — ie automatic, high-volume production of WHEELABRATOR ontinuous Tumblast went to work for Auto Specialties Mfg. o. of St. Joseph, Michigan.

low 3 Continuous Wheelabrator Tumblasts are used to clean malleable castings in the green and annealed stages before and after grinding. On the average, *each machine cleans 60 tons per 8-hour shift.* When production has required it, cleaning has reached the rate of 12 tons per hour — almost 100 tons per machine in an 8-hour shift.

Fewer manhours are required for operating and sorting. Valuable floor space has been saved. Foundry efficiency has been increased. Write today for literature to learn how continuous blast cleaning can cut your production costs.

American
WHEELABRATOR®

trail blazer of industrial progress

AMERICAN WHEELABRATOR & EQUIPMENT CORP. **505 S. Byrkit Street, Mishawaka, Indiana**

Henry Crown, industrialist, chairman, president and director in mining, construction, railroad and management fields, sole owner of New York's Empire State Building, which attracts more than a million visitors annually to the observatories on this 1472-foot high building.

"I multiply my eyes and ears when I read Business Publications"

says

Col. Henry Crown,

President, Empire State Building Corporation

"I can't possibly know everything about every industry in which I am vitally interested," Col. Crown continues, "but through business publications I keep in touch with the important developments in construction, transportation, mining and the operation of hotels and office buildings. My associates, too, make constant use of the business periodicals covering their special fields."

Top management reads business publications because the writers and editors of those periodicals deliver pertinent and specific news coverage. That's why business magazines provide an ideal sales channel for any product or service of sound benefit to business or professional men.

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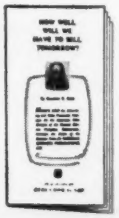
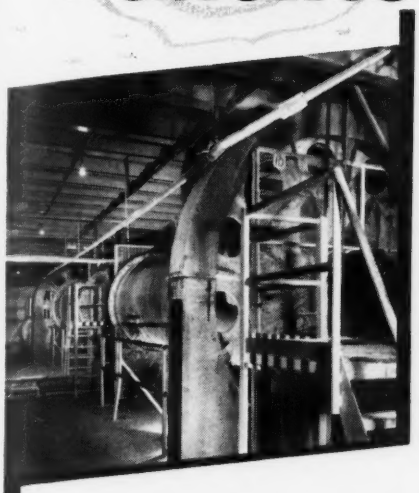
The national association of publishers of 176 technical, professional, scientific, industrial, merchandising and marketing magazines, having a combined circulation of 4,081,858... audited by either the Audit Bureau of Circulations or Business Publications Audit of Circulation, Inc...: serving and promoting the Business Press of America... bringing thousands of pages of specialized know-how and advertising to the men who make decisions in the businesses, industries, sciences and professions... pin-pointing your audience in the market of your choice. Write for list of NBP publications and the latest "Here's How" booklet, "How Well Will We Have to Sell Tomorrow?", by Ralston B. Reid, Advertising & Sales Promotion Manager, Apparatus Sales Division, General Electric Company, Schenectady, N.Y.



WEDRON

where sand is a science



SAND was once a pretty simple thing. You just dug it up and shipped it to people who needed it. That was O.K. some years ago, but sand like everything else has changed. Nowadays sand must be meticulously clean and uniformity is highly critical. Special grinds are needed for special jobs.

High precision casting is making sand specifications tougher and tougher every year. And Wedron is keeping pace. Many thousands of dollars are spent annually by Wedron for new equipment, new processes, experimentation and testing.

Because of this, you're sure of uniformity, purity and fine rounded grain properties that eliminate cutting out of core boxes. And you get the right sand for *every* casting need; the finest silica flour, fine grades for shell molding or coarser grades for standard casting methods. This high quality and diversified output is a result of Wedron's modern program, bringing science to the art of sand processing.

Why not try Wedron sand on your next order? You'll be well satisfied with its superior quality.

MINES AND MILLS IN THE OTTAWA-WEDRON DISTRICT

WEDRON SILICA COMPANY

135 South LaSalle Street, Chicago 3, Illinois

Do You Have Ambitions For Your Business?

Here Are Some Pointers That Can Save Trouble

By Ernest W. Fair

FEW foundry executives are satisfied to let their businesses remain as they are at present; it's an outstanding trait of every American businessman to want his venture to grow and prosper, and foundrymen are no exception.

It takes a great deal more to build a small business into a big one than the desire to do so. A check of several surveys and research reports both on the factors entering into the growth of many such firms from small to large status and on those which failed in an attempt to do so shows a number of proven pointers which should be kept in mind as a business expansion is planned.

It Takes Financing—First and foremost is ample financing of each step upward as it comes along. There are many stories of a business empire that was built by an individual on "shoestring" financing, but close investigation of the tales usually points them up as more fable than fact. Attempting to expand without the funds with which to make the next step properly is the cause of more failures on the part of ambitious men than any other single reason.

Overextending credit to build a business also has accounted for many failures. Credit and money in the bank are little different; the first is based on our honor to make good within a short period of time with money. Generally this period of time is too short to permit the expanded business to pick up such financing.

Is the Business There?—Making certain that new business is available before expanding a plant is a second pointer, one high up on the list. It is foolish to dream of a big and roaring foundry business in the community when the work available would be only half of the plant's capacity. Expanding beyond the ability of the area, beyond the available business, into areas where even a second small plant could not survive, has accounted for many failures.

Too many businessmen go on the assumption that they can obtain a large share of all available business when they make their move upward. That's dangerous programming. More business can be anticipated, but competitors are going to work even harder to hold their customers.

Expansion usually calls for addi-

For longer abrasive life you want...

TRU-STEEL lasts longer than ordinary steel shot. It *should* last longer because it's not only heat-treated, but drawn to exacting tolerances. Tru-Steel saves on machine parts, too, because it will not break down into fines that cause wear . . . *controlled chemistry, plus painstaking control checks give Tru-Steel the right hardness for fast, thorough cleaning.*

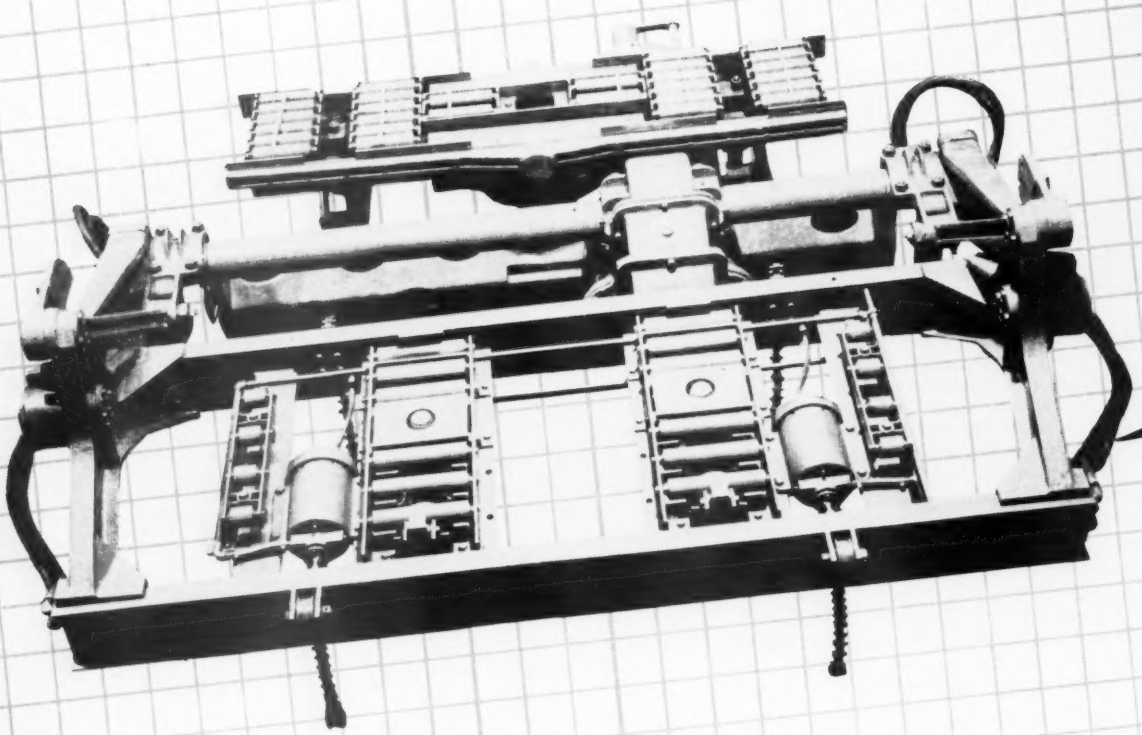
All this adds up to reduced maintenance and lower blast cleaning costs. But that's not all. You'll find that in sizes most popular for blast cleaning, Tru-Steel's original purchase price is lower than any other steel shot of comparable analysis and heat treatment! So you not only save money at the time of purchase but in use also.

Find out what Tru-Steel can do for you. For full information and prices, write us today.

STEEL SHOT PRODUCERS, INC.
BUTLER, PA.
Subsidiary of Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

HERMAN

Charging Conveyor Machine



IDEAL for short-run work

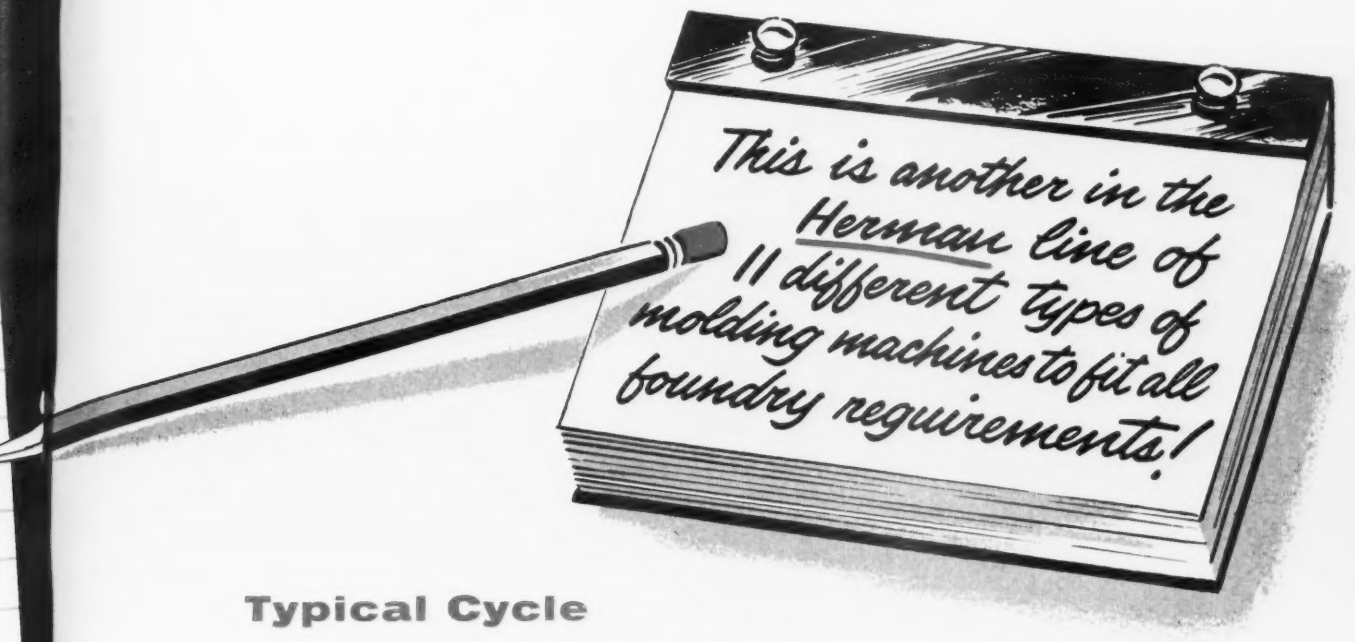
HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.

If your type of work calls for short runs, the Herman Charging Conveyor Rollover and Draw Machine is the modern, economical answer.

Its extreme flexibility, *on either cores or molds,* makes it possible to produce a tremendous range of sizes and types of work.

This comparatively new machine in the HERMAN line is already being widely used in the foundry industry. Foundrymen choose it because it's versatile and operates equally well with either a Jolt Machine or Sandslinger.

It is produced in our broad range from 500 to 20,000 lb. rollover capacities.



Typical Cycle

1. Core box filled with sand and placed on the jolt unit.
2. Power lift conveyor lowers box on sub-plate.
3. Core box is jarred and elevated by power lift conveyor to standard conveyor level.
4. Box goes to Charging Conveyor Rollover and Draw Machine, manually or by pusher mechanism.
5. Pneumatic core box and core plate clamps engage rammed core box for rollover operation.
6. After rollover, core clamps are disengaged and slow draw operation starts.
7. Vibrators separate bond between core box and sand.
8. Fast draw operation checked by speed control device and core box gently deposited directly on discharge conveyor and rolled away on companion conveyor.
9. Inverted turnover plate and core box rolled back to upright position, pneumatic clamps disengaged and box returned to either jolt station or storage.
10. Another rammed core box should, of course, now be at the Charging Conveyor Rollover and Draw Machine for the production of another core.

Why don't you get in touch with us right now for more information. Write for our catalog No. GC-11-53.

HERMAN

Best Known Name in Molding Machines

tional personnel. Is it available? Most successful men look into this first, give it high priority. The majority have learned that absentee operation of a second, third or fourth business requires a good man in each, for the owner can not be everywhere at once. It may seem to the inexperienced that two or three plants can be run as easily as one, but that belief is far from accurate.

A survey of available personnel is desirable whether the expansion calls for a new plant or for enlarging an existing one. Each involves both operating personnel and management personnel. If the latter is unobtainable, the present management staff will be so overburdened it will not be able to function. If inferior managers are hired, the service that has built the business in the past will deteriorate, and production volume will decrease, rather than increase.

The next point calls for an analysis of business possibilities one or two years from date, rather than at present. A current boom condition may justify tremendous expansion today, but if that boom should pass within a year or two after the additional capital investment, future business may be unable to support the increased overhead.

Study the Competition—Another subject deserving closest study is the nature of existing competition. The existing plant may be profitable but, when it is expanded, that situation may change. Many a small plant owner has found business going along smoothly until his ambitions scared his competitors into steps which made his enlarged operation a precarious one for the first year or two. A "live and let live" state of competition can turn into a "cut-throat" one overnight. It's wise to be prepared financially for this possibility.

A close analysis of possible effects on overhead costs is most advisable before any expansion is made. A detailed analysis of costs of the proposed operation should be prepared to the most minute detail. Also it should be determined whether existing management has the knowledge and experience to do business at the expanded competition level.

Keeping Old Customers—It also is advisable to consider the type of customers on whom the present business was built. Will the proposed expansion permit holding all of this existing business as well as the acquisition of additional volume? Volume figures alone cannot be used in making such a study. The fields in which the company has made a reputation and acquired particular skills must be analyzed specifically. When the business expands out of these fields it may be entering new ones without a reputation with which to attract business.

An analysis of present competition also is of great importance. A hasty look at the field may show considerable promise for any expansion, but a closer examination could re-

Chicago Rubber Company's amazing new R54 contact wheel cuts better—faster—longer and will substantially reduce your grinding and polishing costs 3 ways.

This precision machined and accurately balanced wheel is easily and quickly knocked down and reassembled for tire replacement or change.

- Replace only the rubber tire when necessary instead of the entire wheel.
- Choose from a complete assortment of tire treads for different grinding operations, still using the same wheel.
- And as usual Chicago Rubber Company's R54 contact wheel allows you to get the most wear from your abrasive belt—more than you ever got before.

There is a replaceable rubber tire with proper tread for every grinding requirement and in a wide variety of durometer ratings. Write for descriptive literature.

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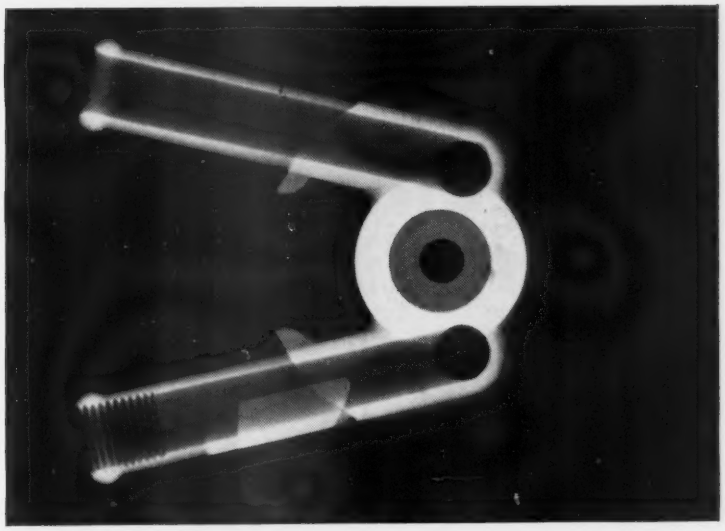
Main Office & Factory
2620 N. Clybourn Ave. Chicago
Makers of the COSMOWHEEL

"IT'S THE WHEEL THAT DOES THE WORK"

"Wilson, I wish you'd quit referring to this department as skid row!"



More for the money?

RADIOGRAPHY SHOWED HOW

This casting was a part for an automotive heater. With a big run and a low price, profit hinged on a high yield of sound castings.

Radiographs made of pilot castings revealed a few recurring faults and indicated how a minor change in casting technics could increase the yield.

This is just one more example that shows why it pays to use radiography—one more reason you find more and more progressive suppliers of castings using it.

If you want to be known for releasing only high-quality work, if you want to improve production—look into radiography. Your x-ray dealer will be glad to show you how it can help. And, if you wish, we'll send you a free copy of "Radiography as a Foundry Tool."

Radiography . . .

another important example of photography at work

EASTMAN KODAK COMPANY
X-ray Division, Rochester 4, N. Y.

Kodak
TRADE-MARK

YOU WOULDN'T WANT *an abrasive that lasts forever!*

For the simple reason that it wouldn't clean at all.

Abrasive economy lies in a nice balance of 1. long life, 2. cleaning efficiency, 3. low maintenance costs and 4. speed. Permabrasive annealed iron shot and grit are engineered to meet these requirements BETTER; made from chilled iron abrasives of proper composition, we KNOW and you KNOW exactly what they can do. We'll guarantee a savings over your present abrasive costs— in writing— . If we fail, we will give you a check to produce the guaranteed savings* and a test won't upset your apple cart: it is simple to make with the "electric timing device." Ask about it.

*10% in the case of Permabrasive
15% in the case of Controlled T

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THE NATIONAL METAL ABRASIVE COMPANY
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THE WESTERN METAL ABRASIVES COMPANY
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veal a different story. When potential of expansion is analyzed, possible steps of a like nature by other firms in the area must be considered. What effect will they have?

Possible effect of future industrial developments also must be considered. Improvements in technology may lead to obsolescence of much new equipment bought for use in the big plant. Thorough study of research work adapting not only existing knowledge, but that which may come out of research laboratories in the future, should be part of any expansion plans.

An expansion program should be undertaken only after detailed planning and careful consideration of all of the problems involved. It always should be a step-by-step procedure, not one big leap.

Lists Buyers of Surplus Goods

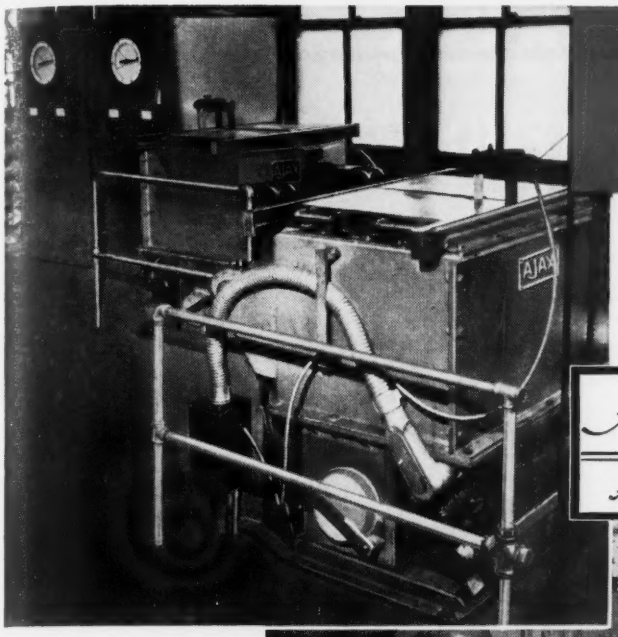
Over 25,000 firms in the United States who buy surplus supplies and equipment have been listed by Dunhill International List Co., 565 Fifth Ave., New York 17. Buyers are arranged geographically and classified by industry with complete mailing addresses. The list has been delivered to the Defense Department which has distributed it to Army and Navy surplus material depots. Private sellers of such material can obtain the list for $25.

Book Review

Technical Dictionary (Dizionario Tecnico) by Dr. Giorgio Marolli, cloth, 1075 pages, 5½ x 8¼ in., published by F. Le Monnier Editore, Firenze, Italy.

This fifth edition of a well known English-Italian dictionary for the technical field has been revised and amplified to contain some 90,000 words or terms. It also contains a number of conversion tables and 35 large fold-in drawings of such equipment as airplanes, locomotives, machine tools, etc., which are keyed with the representative Italian and English terms.

Book is divided into two parts comprising the English-Italian and Italian-English terms and words. In each where the word or term has different connotations in various fields, those are indicated with explanatory notes and examples so that the user is assured of the correct meaning. For the Italian user the pronunciation of English is indicated according to International Phonetic Association system. Since the Italian language is almost phonetic this is not required, but in those instances where variants occur, they are indicated.



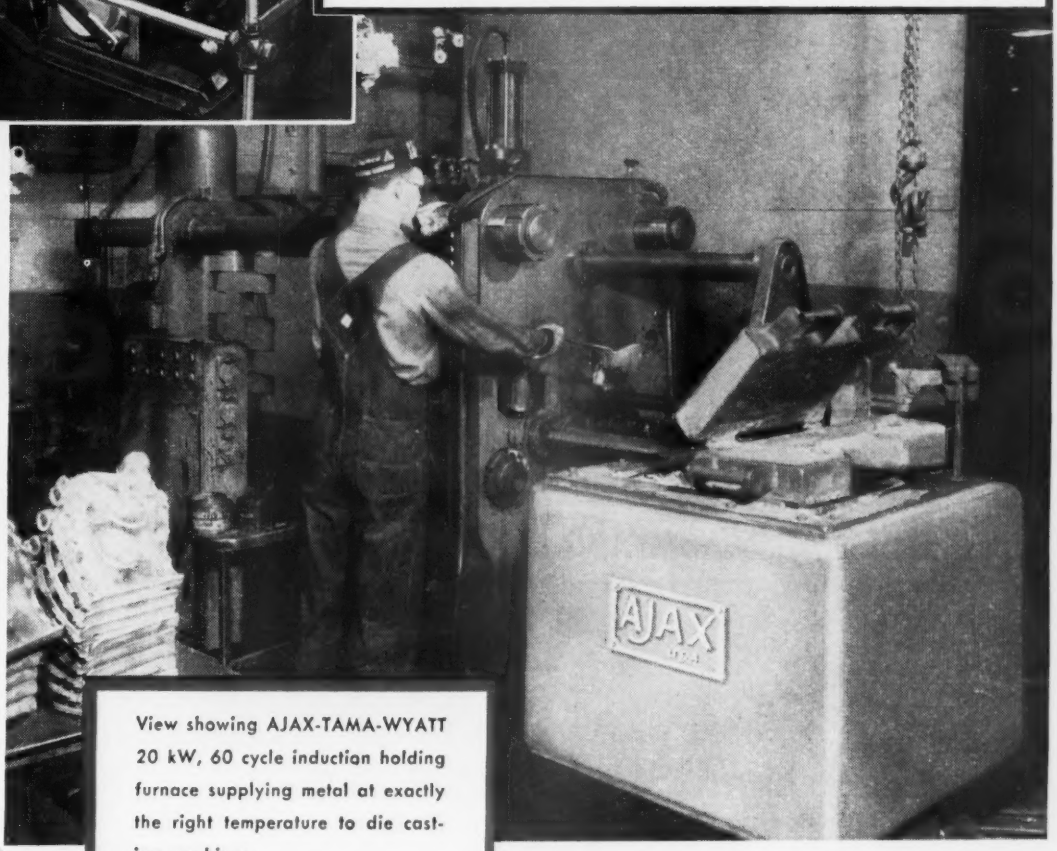
AJAX INDUCTION FURNACES

mean Higher Quality Castings for...

Advance
TOOL & DIE CASTING COMPANY

Aluminum DIE CASTINGS *Zinc Base*

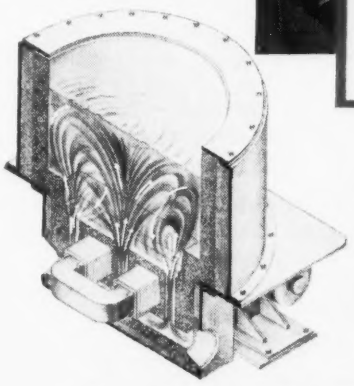
View above shows AJAX melting furnaces, with control cabinets in background.



View showing AJAX-TAMA-WYATT 20 kW, 60 cycle induction holding furnace supplying metal at exactly the right temperature to die casting machines.

The Furnace That Stirs Itself...

The sectional view below shows the twin-coil stirring action of the 100 kW, 60 cycle AJAX Induction Furnace. Heat induced in the secondary channels below is conveyed throughout the melt by electro-magnetic circulation, as shown by the arrows.



Inherent stirring action of these furnaces has proved most valuable to ADVANCE TOOL & DIE CASTING CO., Milwaukee, Wisc. In full operation for 18 months, the most important result of the use of these furnaces is higher quality die cast aluminum parts. The alloy is held in uniform solution, resulting in elimination of oxides, reducing hard spot trouble in secondary machining to a negligible factor. Temperature of the melt is held at 1170° F. through on-off control of the low power circuit. Working conditions are made more comfortable because of low heat losses. The units take up very little floor space.

AJAX ENGINEERING CORP., TRENTON 7, N. J.

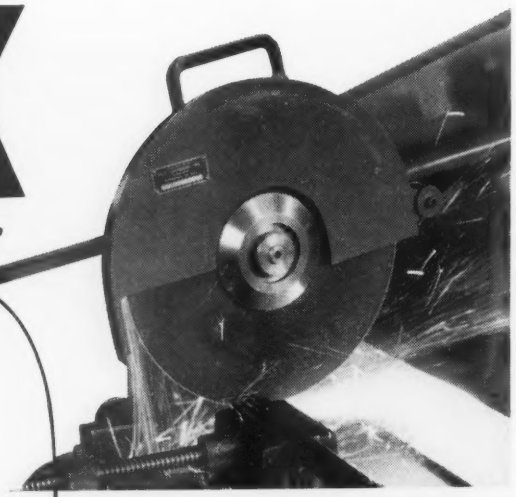
AJAX TAMA-WYATT **INDUCTION MELTING FURNACE**

AJAX ELECTRO METALLURGICAL CORP., and Associated Companies
AJAX ELECTROTHERMIC CORP., Ajax Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., The Ajax Hultgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax Wyatt Induction Furnaces for Melting

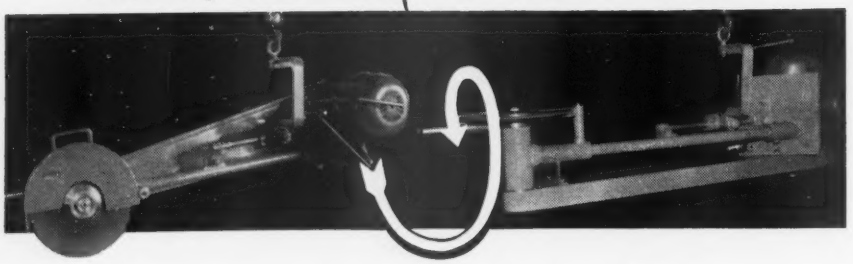
ACTIVITIES
of Foundry Groups

Birmingham: A wide variety of subjects was discussed at the Mar. 11 meeting of the AFS chapter at Tutwiler Hotel, Birmingham. Eighty-five members and guests attended. Coffee speaker was Aubrey C. Ross, assistant district director of the Internal Revenue Service. He discussed the significant changes in the revenue code for 1954. C. K. Donoho, chairman, Educational Steering Committee, detailed a forthcoming lecture series on advanced foundry practice. T. H. Benners, chairman, Nominating Committee, presented the nominations for officers for 1955.

FOX
SWING FRAME
CUT-OFF
MACHINE



FOR FAST REMOVAL OF SPRUES AND RISERS FROM BRONZE, ALUMINUM AND IRON CASTINGS!



FULL MANEUVERABILITY THROUGH 180°

The new Fox Swing Frame Cut-Off Machines have been designed to take advantage of the new type "flexible" cut-off wheels. The machine has full maneuverability through 180°. It is especially recommended for the removal of sprues and risers from bronze, aluminum and iron castings.

Available in two sizes, 16" and 20". Write for Catalog!

FOX GRINDERS, Inc.
OLIVER BUILDING PITTSBURGH 22, PA.

Technical portion of the meeting provided a film, "Effect of Gating Design on Casting Quality." Film resulted from an AFS-sponsored research project investigating the flow of molten metal into a mold. Morris L. Hawkins, Stockham Valves & Fittings Inc., lead the discussion of the film.—*J. A. Wickett, U. S. Pipe & Foundry Co.*

San Antonio Section: Forty-three members and guests of the AFS chapter section met at Alamo Iron Works on Mar. 7 to hear a talk on metals by Dr. Robert J. Anderson, head of Metallurgy Department, Southwest Institute of Inventive Research. A safety film, "The Gambler," also was shown. Refreshments were sponsored by Texalloy Foundry Co.

The group met again at Alamo Iron Works on Mar. 21, with 55 members and guests attending. Harry W. Dietert addressed the group on sand and shell molding. Refreshments were sponsored by W. H. Winterborne & Sons.—*George H. Hartwell.*

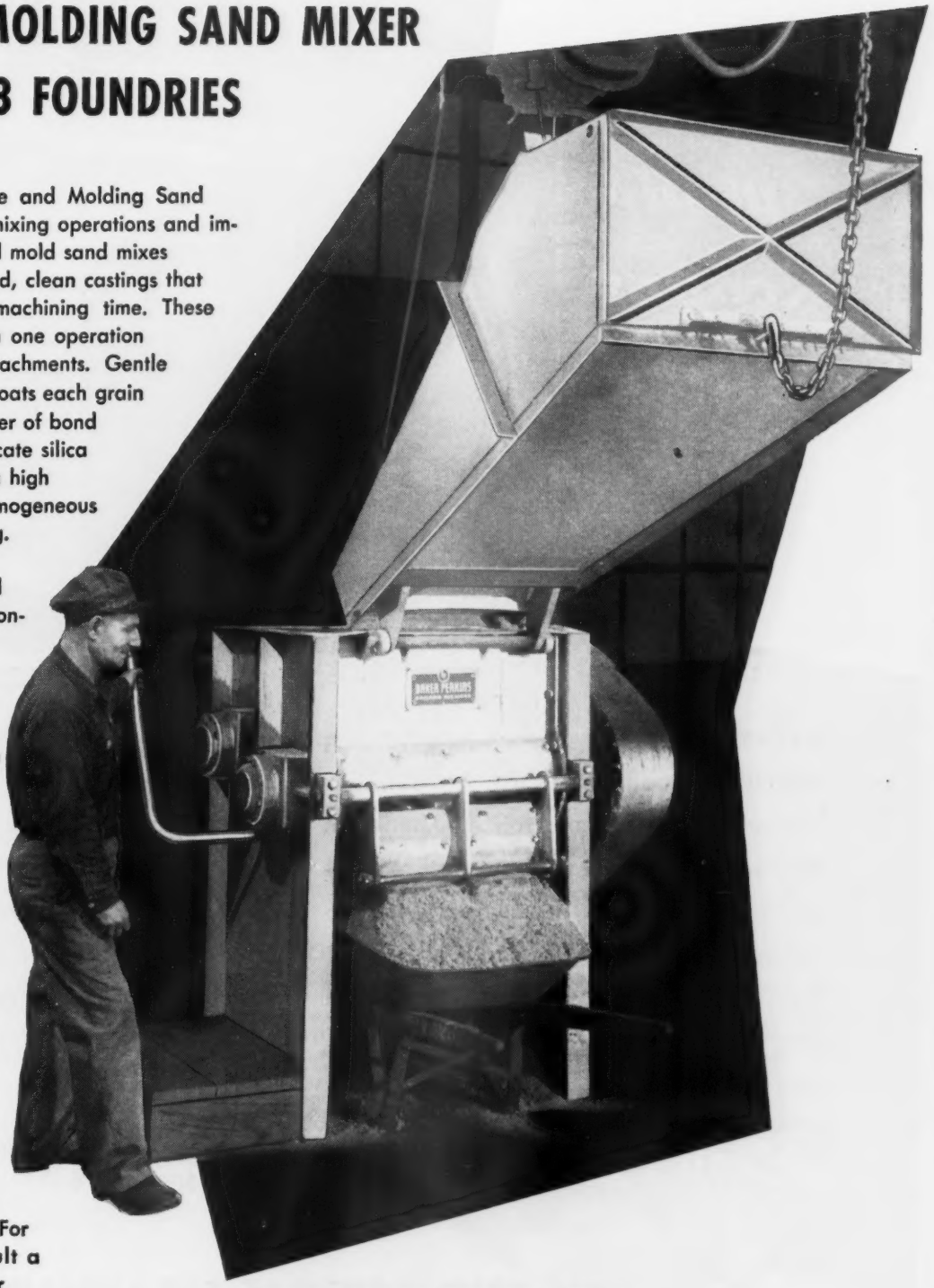
Central New York: Zigmond Madacey, field service engineer, Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago, spoke before 116 members of the AFS chapter on Mar. 11 at the Roof Garden, Hotel Onondaga, Syracuse, New York. He traced the history of coreblowing and the major factors involved in making good blown cores, with emphasis on sand control, causes of sagging cores, and the importance of co-operation between the pattern shop and the coreroom. To more clearly illustrate proper methods of venting and coreblowing, slides were shown.—*Bruce R. Artz, Pangborn Corp.*

Pittsburgh: Some 110 members of Pittsburgh Foundrymen's Association met Mar. 21 at Webster Hall Hotel, Pittsburgh, to hear John M. Crockett, manager, metallurgical section, Air Reduction Co., speak on "Carbide Injection of Nodular Iron."

Speaker showed equipment used to introduce calcium carbide below the surface of molten iron, including carbide storage hoppers, a conveying line and an injection tube. A gas carries solid particles into the metal and independent control of gas and solid is necessary for injection. Nitrogen is used as the carrier gas in most

BAKER PERKINS SIZE 14

BATCH TYPE UNIDOR CORE AND MOLDING SAND MIXER FOR JOB FOUNDRIES



BAKER PERKINS Unidor Core and Molding Sand Mixers help speed up sand mixing operations and improve the quality of core and mold sand mixes so that you can produce good, clean castings that require less shakeout and machining time. These mixers rub, stir and knead in one operation without special aerating attachments. Gentle and thorough mixing action coats each grain of sand evenly with a thin layer of bond without breaking up the delicate silica grains. The mixed sand has a high degree of permeability, is homogeneous and does not require riddling.

BAKER PERKINS Unidor Sand Mixers are strong and well constructed with a simplified operating mechanism that helps keep maintenance and operating costs low. The No. 14 Mixer shown here has a fabricated steel trough shell and cast iron ends, renewable steel liners, and cast steel Sigma blades with renewable wearing shoes of hardened steel. It has a working capacity of 5.5 cu. ft. BAKER PERKINS Unidor Mixers are available for job foundries in capacities up to 35 cu. ft. These models can be adapted to or equipped with air or electrically operated skip hoists. A laboratory model with a working capacity of 1500 to 2000 grams is also available. For complete information, consult a BAKER PERKINS sales engineer or write us today.

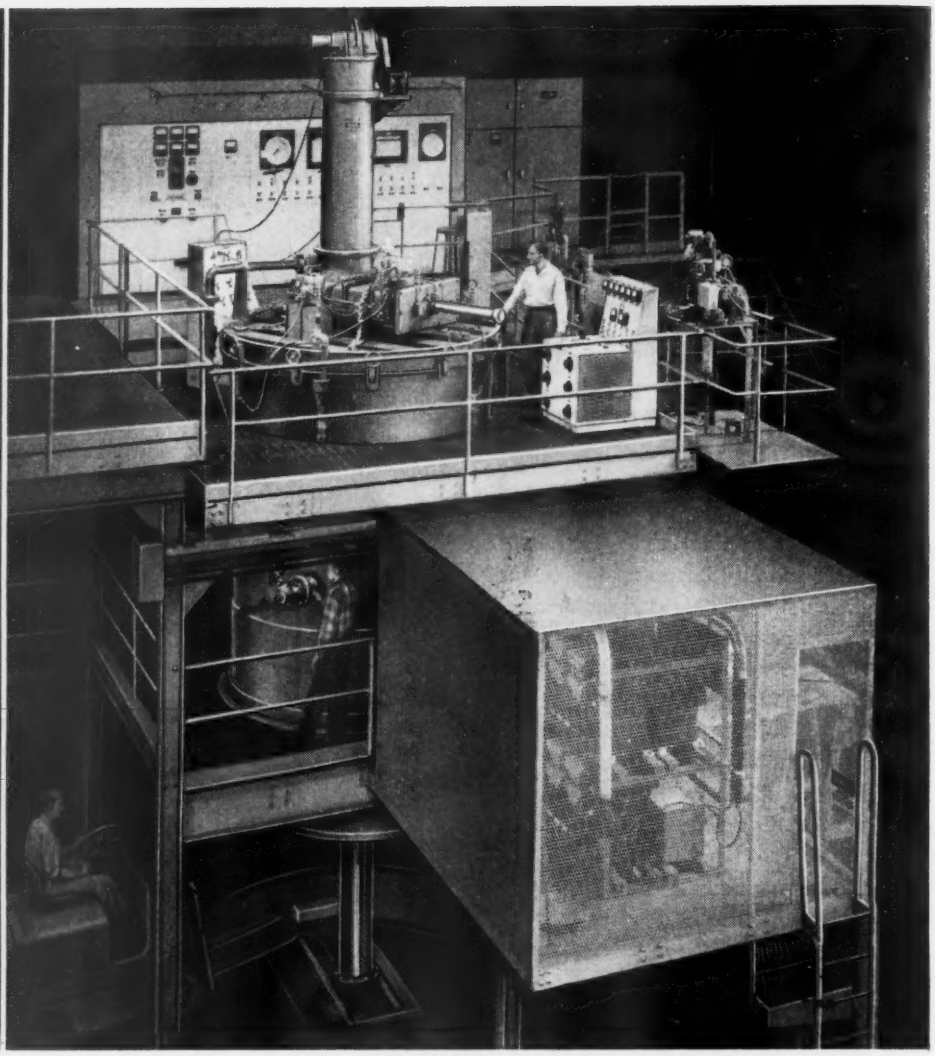
BAKER PERKINS INC.

CHEMICAL MACHINERY DIVISION

SAGINAW, MICHIGAN

276

what made vacuum melting work?

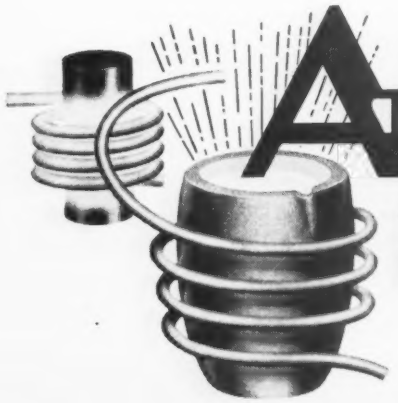


The first 1000-lb. vacuum furnace to be put into production. Photo courtesy Universal-Cyclops Steel Corp., Bridgeville, Pa.

primarily—newly discovered vacuum techniques applied to forty years of induction furnace manufacturing experience. And only at Ajax does this experience cover so many melting developments over such a long period of time. Successful vacuum melting, as it comes from Ajax today, is just another refinement in Ajax quality melting at production speed.

The vacuum furnace illustrated above is typical of a number which are now being built for purer, stronger alloys in capacities from 5 to 2000 lbs. For details, write Ajax Electrothermic Corp., Trenton 5, New Jersey.

Associated Companies: Ajax Electric Company—Ajax Electric Furnace Co.—Ajax Engineering Corp.



AJAX NORTHRUP *SINCE 1916*

INDUCTION HEATING-MELTING

instances and is measured carefully.

It was pointed out that a unique feature of calcium carbide when injected in metal is its consistency in removing sulphur. Under normal conditions 10 lb of calcium carbide will remove 1 lb of sulphur. Carbide decomposes 12 to 15 in. below surface of molten metal, the speaker added. Product of decomposition is dry as temperatures are well below the melting point. A dry slag means that sulphur stays in the slag and slag handling is not difficult.—*Robert E. Love.*

Washington: Election of officers and discussion of aluminum castings were features of the Mar. 22 meeting of the AFS chapter at Tacoma, Wash. Guest speaker was Donald L. LaVelle, assistant manager, aluminum department, Federated Metals Division, American Smelting & Refining Co. Meeting attracted 44 members and guests. Mr. LaVelle discussed six casting defects commonly associated with aluminum castings and presented slides to illustrate them. The defects included inclusions, pin holes, shrinks, rat tails and cracked castings due to heat treatment.

Ed Boyle of the chapter gave a demonstration of hardening cores by using CO_2. He made some cores of new silica sand mixed with about 6 per cent sodium silicate and mulled. Cores were removed onto a regular core plate and sprayed with a fire extinguisher containing CO_2. Carbon dioxide reacts with the sodium silicate and immediately hardens the core so it can be handled and used at once. Mr. Boyle explained that the technique can be used successfully for ladle linings.

Newly elected officers are: Chairman, William A. Shaug, South Seattle Steel Foundry Co.; vice chairman and membership chairman, Harold R. Wolfer, Puget Sound Naval Shipyards; program chairman, William K. Gibb, Atlas Foundry & Machine Co.; directors, Vernon W. Rowe, Ballard Pattern & Brass Works, Dominic Coccione, Washington Iron Works and Fred R. Young, E. A. Wilcox Co. —*William K. Gibb, Atlas Foundry & Machine Co.*

St. Louis: "Pattern Engineering and Co-ordination of Methods to Produce Better Castings" was the subject of Guy A. Pealer, casting design engineer, General Electric Co., at the Mar. 10 AFS chapter meeting. A capacity crowd of 130 members and guests attended. Awards in wood and metal patternmaking and molding were made by Dale Arnette, chapter apprentice training chairman. Prizes were in cash as well as student mem-

Crescent Chaplets

FUSE-TITE

While we have just about every size and type of chaplet you can think of, there is a *possibility* that we don't have the *exact type* you require. In that case, we can design and develop *just the chaplet* to suit your requirements! We have all sorts of working samples available, and are always ready to ship them in a hurry to those who wish to try them.

A FEW OF OUR SPECIALTIES

- RADIATOR CHAPLETS
- SHOULDER CHAPLETS
- BOILER CHAPLETS
- DOUBLE HEAD CHAPLETS
- MOTOR CHAPLETS
  Regular or Extended Stems
- TIN TUBES
- CHAPLET NAILS
  Plain, Nicked or Barbed
- SKIM GATES
- CORE WIRES
- CORE TINS & SHIMS
- TAPER DRIVE PLUGS

Crescent FUSETITE CHAPLETS are accurately made of proper analysis materials for the fusing-in process. We have been devising and supplying chaplets since 1889, and our stocks are amazingly ample and varied. We originated Radiator, Shoulder, Double Head and Motor Chaplets, and if necessary, we can originate Special Chaplets for YOU.

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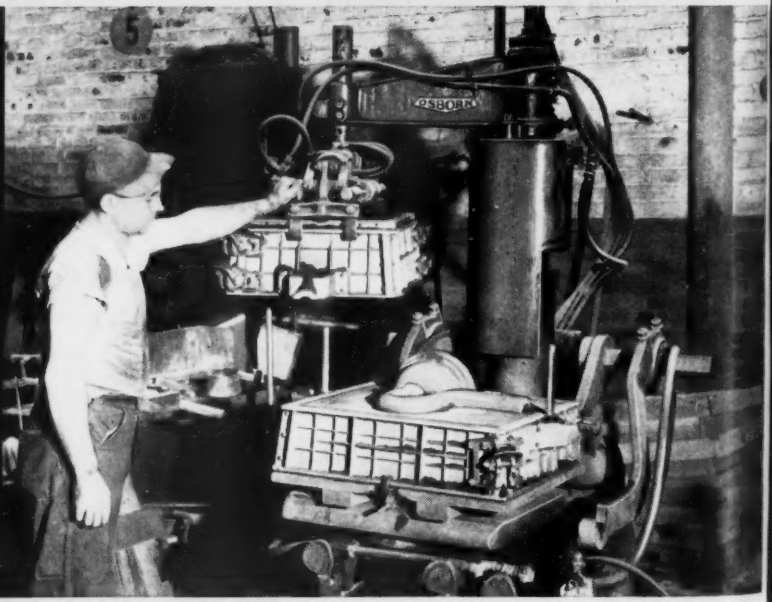
200%

BIG SAVINGS ON THESE MOLDS



3 times the molds per day as Rota-Lift increases production efficiency of fittings with match-plate patterns. Here, operator swings cope into position for closing the mold.

more molds a day on match-plate molding

Osborn Rota-Lift's mechanized molding eliminates heavy manual effort

OSBORN Rota-Lift is the molder's helper . . . and the manufacturer's, too. It eliminates heavy manual work . . . turns out three times the mold production from large match-plate patterns.

In addition to jolting and squeezing, Rota-Lift helps the molder roll molds over, draw the cope and close the mold. The molder can use larger flasks, produce more castings per mold.

An Osborn specialist can help you cut foundry costs with Rota-Lift or with automatic and semi-automatic molding machines in Osborn's complete line. Call or write.

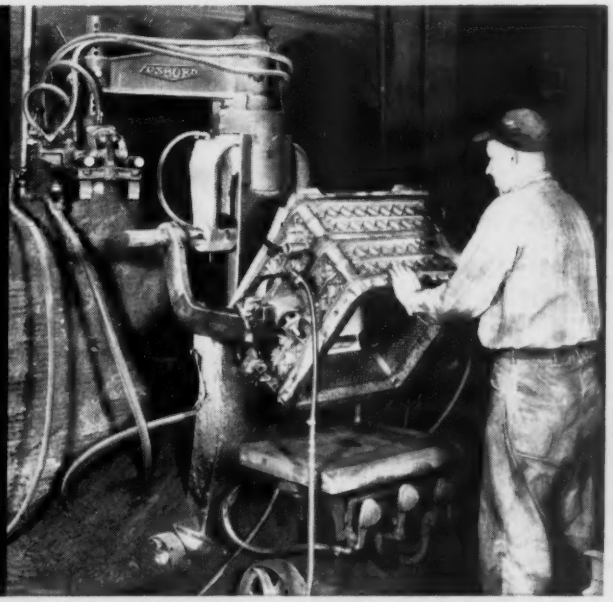
Another example of Osborn leadership and advanced engineering

OSBORN

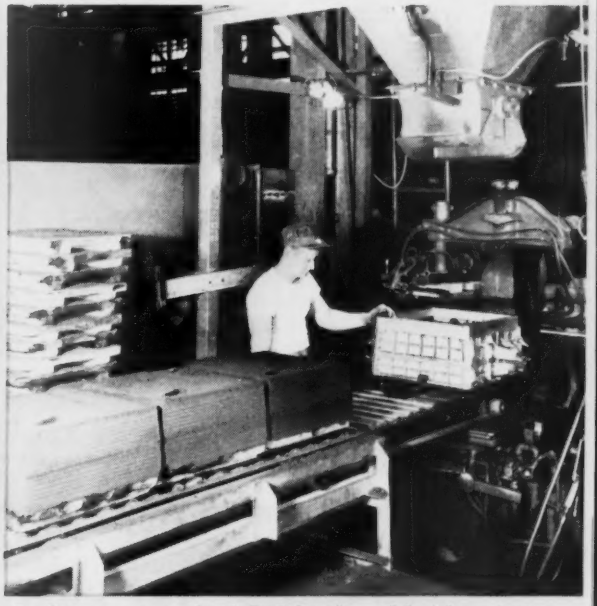
MOLDING MACHINES CORE BLOWERS
INDUSTRIAL BRUSHES

THE OSBORN MANUFACTURING COMPANY
5401 HAMILTON AVENUE CLEVELAND 14, OHIO

ROTA-LIFT ELIMINATES HEAVY WORK

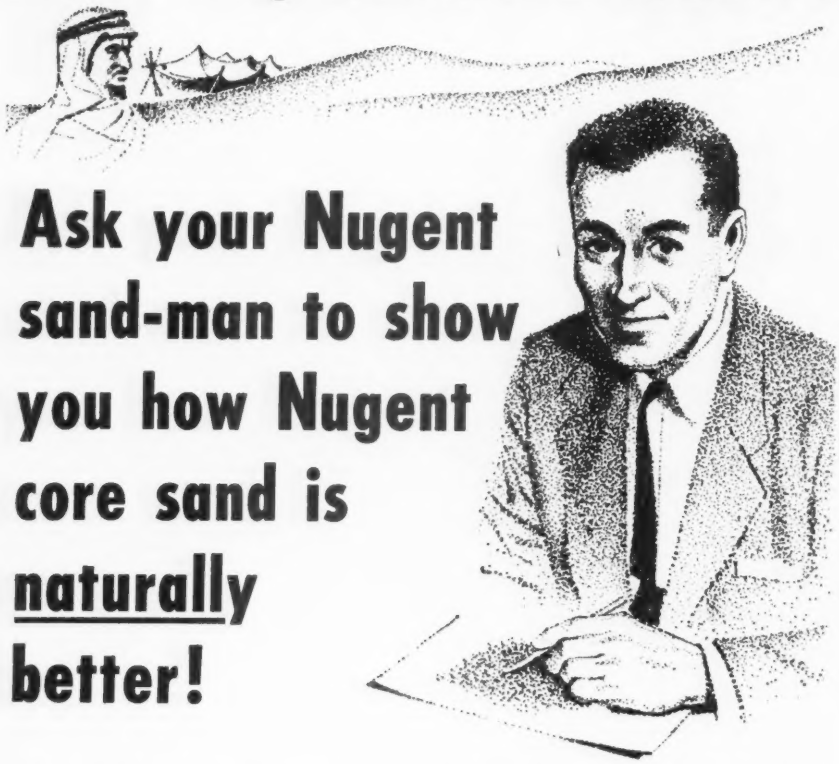


No more heavy lifting. Rota-Lift helps the molder roll molds over, draw the cope and close the mold to cut foundry molding costs.



Assists removal of finished mold. After closing the mold, Rota-Lift suspends the mold for easy positioning on conveyor.

There's a big difference in sands . . .



Ask your Nugent sand-man to show you how Nugent core sand is naturally better!

Put samples of Nugent sand to the test in your sand lab — you'll *see* why it's naturally better! Nugent sand is processed from the best Muskegon dune sand, washed pure by nature for centuries . . . kiln-dried to the correct moisture content, then graded to a uniform AFS grain analysis. This means less core breakage, consistently uniform molds, greater pattern definition and finish, plus freedom from defect-producing components.

5 GRADES OF CERTIFIED SAND

A constant AFS grain analysis of 40, 44, 49, 52 and 55 is maintained through continuous testing with up-to-date laboratory methods. Exacting control processes result in uniform green strength, permeability, moisture, grain distribution, and other characteristics. You get *known* sand quality and unsurpassed uniformity from a source preferred by foundrymen for over 40 years.

See your Nugent sand-man or write direct for proper core sand recommendations. Samples on request.

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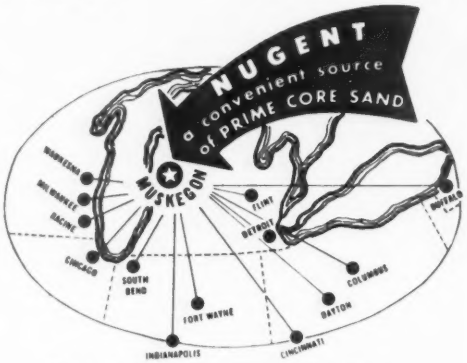

Thanks to Nugent's convenient location, you can count on prompt shipments of sand by 3 main railroads or truck when you need it.

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Nugent is always ready to serve you with graded sands for the foundry.

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bership awards in the chapter.

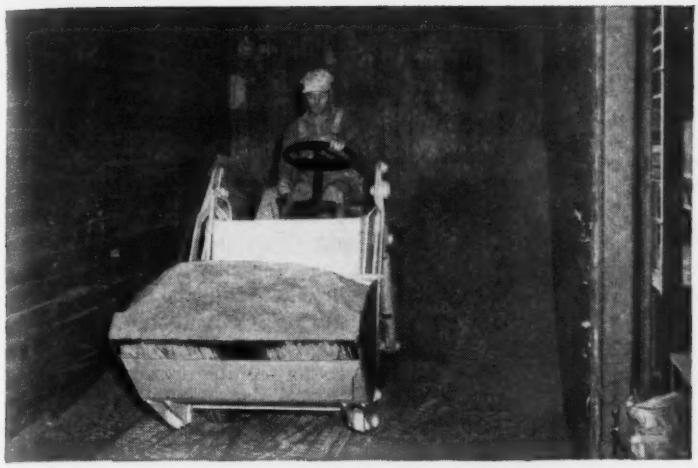
Mr. Pealer opened his remarks with the early history of metalworking and foundry industries and a discussion of some of the first methods of metal fabrication. He emphasized the importance of getting substantial and accurate patterns. Cheap and makeshift patterns are no bargain. Lower casting costs will result from close co-operation between the design engineer and the foundryman. Speaker pointed out that among the hazards to be avoided are combination or "family" patterns and half coreboxes, rather than full coreboxes and driers. —*Jack R. Bodine Jr., Bodine Pattern & Foundry Co.*

British Columbia: A practical demonstration of shell molding at Letson & Burpee Foundry Ltd., featured the Mar. 25 meeting of the AFS chapter, with 110 members attending. Larry Teeple, engineer, Shalco Engineering Co., Palo Alto, Calif., was the guest speaker and presented a brief and instructive discussion of the various sand and resin mixtures as applied to manufacture of shells. The company's shell molding machine and coreblower were kept in operation so members could see the procedures and question Mr. Teeple.

The chapter's annual educational course was conducted during April at the Vancouver Vocational Institute. Meetings were held each week and subjects covered were Testing of Metals, Apr. 6; Refractories for Foundry Industry, Apr. 13; Sand Mixing, Properties and Control, Apr. 20, and Chipping, Grinding, Cleaning and Welding of Castings, Apr. 27.—*J. T. Hornby, Balfour, Guthrie (Canada) Ltd.*

Wisconsin: Management night meeting of the AFS chapter on Mar. 11 at Hotel Schroeder, Milwaukee, featured a talk on "Practical Applications of Foundry Quality Control" by Allen A. Evans, Indianapolis Works, International Harvester Co. Mr. Evans stated that the foundry industry must continue its search for new and better methods to produce quality castings. To do this requires not only some kind of control in the cleaning room, but more importantly, greater care in the core and molding departments. By using quality control as the tool, foundry problems are brought to light and can be solved.—*John E. Hubel.*

Cleveland Non-Ferrous: Non-Ferrous Founders' Society chapter met Mar. 24 at Cleveland Athletic Club, Cleveland, and saw two films, "Production for Finish" and "Polished Blade." Films were shown by Messrs.



Shortest Turning Radius

——AT FARM BUREAU SERVICE, Clark's Y-20 Scoop rolls into boxcars to handle fertilizer. With the shortest turning radius of any machine on the market, a tight 71 inches, the Y-20 is unbeatable for handling packed material in cramped quarters. See for yourself . . . ask for a demonstration.

Full 60" Dumping Clearance

——AT AMERICAN MARSH PUMP, the Y-20 Scoop shovels molding sand into shaker. Here's *clean-up-ability* . . . close scraping of floors, corners and sides. The Y-20 Scoop has plenty of reach for high hoppers, has a 60" clearance under the lip, will easily dump into bins and hoppers 86" high. See an "action" demonstration.

Full Bucket Loads Every Time

——AT ALLIED PAPER MILLS, clay is handled 17% faster with Clark's Y-20 Scoop. Low-level hydraulic tilt-back guarantees full bucket loads every time, permits carrying in lowered position without spillage. There's plenty of power, plenty of traction—fully loaded, the Y-20 Scoop will climb a 14% grade. Ask for a demonstration.

Dollar for dollar Clark's New Y-20 Scoop will outperform anything in its field.
Ask for a demonstration!

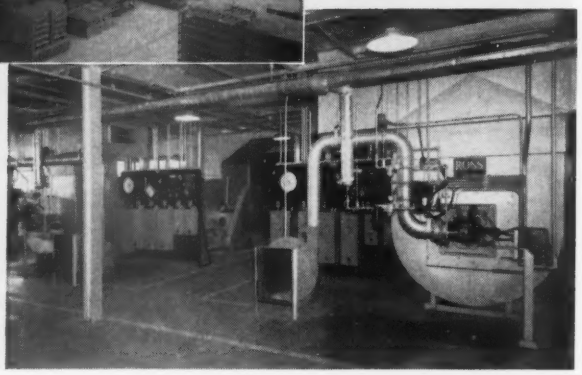
Industrial Truck Division, **CLARK EQUIPMENT COMPANY**, Battle Creek 16, Michigan.

A BETTER BUY WITH LOCAL SUPPLY— *Genuine Clark Parts*

CLARK® EQUIPMENT

Automation comes to CORE BAKING with modern ROSS Ovens

View from entering end of ROSS oven showing catwalk and conveyor drive, with heater and air tempering coils housed above oven.



ROSS heating equipment showing burner end of heater, recirculating ductwork, filters, etc. Note compact grouping of controls and starting equipment.

ROSS *Overhead Nozzle System Insures Uniform Air Distribution*

For one of America's leading automobile manufacturers, core baking has been really mechanized to effect sizable savings in material and operating costs. The two ROSS Horizontal Core Bake Ovens, each complete with heating and cooling equipment, are designed with conveying apparatus both inside and outside of the oven.

Each oven consists of 4 baking passes and 2 cooling passes in a separate insulated enclosure. Rows of specially designed and directed nozzles insure even distribution of treated air.

ROSS Conveyorized Core Baking Systems can prove a paying investment for large or small foundries. Write us for detailed information.

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Frank Zaccola, Douglas Forbush and Joe Zaule of Minnesota Mining & Mfg. Co. A general discussion followed on the advantages and disadvantages of belt and abrasive wheel grinding.—*Walter O. Larson Jr., W. O. Larson Foundry Co.*

Twin City: Mar. 8 meeting of the AFS chapter at the Wagon Wheel restaurant, Minneapolis, featured a panel discussion of sand practices in gray iron, steel and nonferrous foundries. Panel members were: Gray Iron, L. M. Malis, Crown Iron Works; steel, Ed Anderson, American Hoist & Derrick Co., and nonferrous, C. C. Hitchcock, R. C. Hitchcock & Sons Inc. H. H. Blosjo, Minneapolis Electric Steel Castings Co., served as moderator. Panel unanimously agreed on one principle applying to all shops—rigid adherence to control test limits established on experience found with sand in each particular shop.

Several thousand high school and college students in the Twin City area attended a Career Festival at St. Thomas College, St. Paul, on Mar. 8-10. Members of the chapter and representatives of major industries took advantage of the vocational guidance conference to better acquaint students with future potential and career possibilities in the cast metals industry. —*R. J. Mulligan, Archer-Daniels-Midland Co.*

Oregon: Forty-five members of the AFS chapter met at Columbia Athletic Club, Portland, Oreg., on Mar. 23, to hear Donald L. LaVelle, assistant manager, aluminum department, Federated Metals Division, American Smelting & Refining Co., discuss correction of casting defects in his talk, "Making Better Aluminum Castings." Mr. LaVelle used slides, sample castings and blackboard illustrations in pointing out problems in melting, degassing, pouring, gating and risering of aluminum castings.

Chapter presented the complete publications of the AFS as a gift to the Multnomah County Library Association. Robert E. McGuire, assistant technical librarian, accepted on behalf of the library association. J. T. Dorigan, Northwest Regional Conference Chairman, announced plans for the conference to be held in Portland, Oct. 14-16.—*Bill Walkins, Electric Steel Foundry Co.*

Michigan State: Student chapter met Feb. 15 and heard Dr. Frank Rote, technical director, Albion Malleable Iron Co., speak on general subject of "Company Training Programs for Engineering Graduates," with spe-

DOW CORNING SILICONES **in the Foundry**

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Expose a straight silicone paint to surface temperatures in the range of 650 F for 10 hours a day and it remains in excellent condition almost indefinitely. Under the same conditions, good, high temperature organic paints soon blister and peel, frequently within hours after application.

That has been the experience of maintenance men at the Saginaw Bearing Co. of Saginaw, Michigan, in testing various paints on their bronze-melting furnaces. Six months ago, after wire brushing a furnace to bare metal, they brushed on a single coat of straight silicone-aluminum paint. Cured in service, the coating is still in near-perfect condition. Compare its appearance in the photo foreground with that of the second furnace which was recoated with organic paints dozens of times during the past six months.

A complete list of formulators supplying silicone-based protective coatings is now available. For your free copy

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Designed especially for small job foundries and for experimental work, the new Gee Shell Mold Machine features simplicity, economy and ease of operation. Manufactured by the Metco Processing Corporation, Ypsilanti, Michigan, the Gee requires only air and gas service for complete installation. Shell molds and cores may be made separately or simultaneously from patterns up to 20" x 30" x 6".

Simplify Shell Molding with DOW CORNING 8 EMULSION

- **Assure Fast, Positive Release**
- **Keep Patterns Clean**
- **Nonflammable and Noncorrosive**
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Shell molding becomes easier, more accurate, and more economical when you use Dow Corning 8 Emulsion. Especially designed for the shell process, this silicone parting agent gives you clean, easy release every time with little or no build-up on even the most complex patterns. Cleaning costs are minimized, and you obtain increased production of shells with uniform dimensional accuracy. For more information and a free trial sample, return the coupon today.

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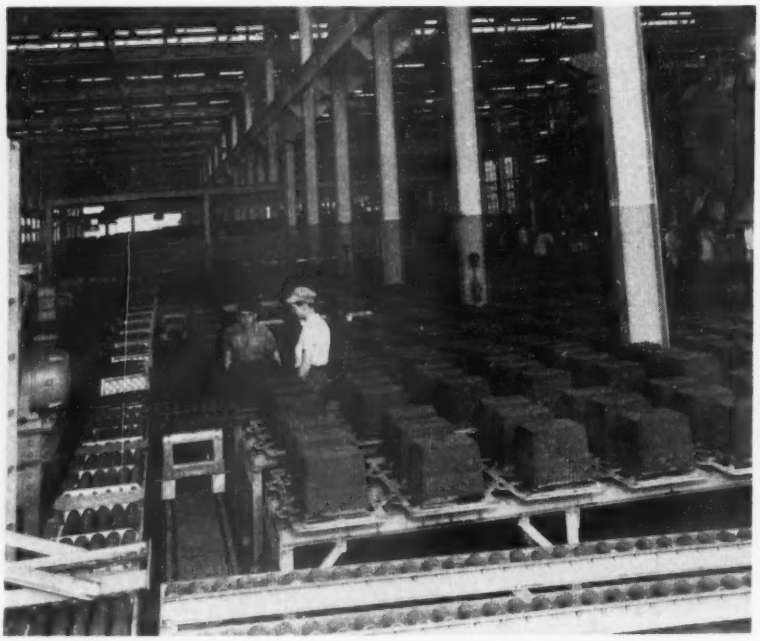

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MATHEWS

cial references to the field of cast metals. He advised 25 students attending to seek employment with companies that have broad training programs that are organized and guided by competent engineers or other technically trained men.—*Prof. C. C. Sigerfoos.*

Connecticut: Non-Ferrous Foundrymen's Association chapter met Mar. 16 at Quinnipiack Club, New Haven, Conn., and heard a discussion of "Electronic Core Baking" by Nelson B. Stevens, field engineer and consultant, Induction Heating Corp., Brooklyn, N. Y. Mr. Stevens opened his remarks by touching upon the development and years of research required to build production units.

His company's process uses the fundamental principles of dielectric heating. As soon as cores leave the oven they are ready for use. Using resin binders, the process makes it possible to adjust readily and control the characteristics of the cores. The equipment is designed specifically for foundry operation and with modifications can be used equally well on low as well as high cores.

Slides were shown illustrating installations and operation of various models of core ovens with panel controls. A discussion followed on the use and development of driers in conjunction with dielectric core baking. There have been indications that use of plastic driers has increased production rates.—*Frank B. Diana.*

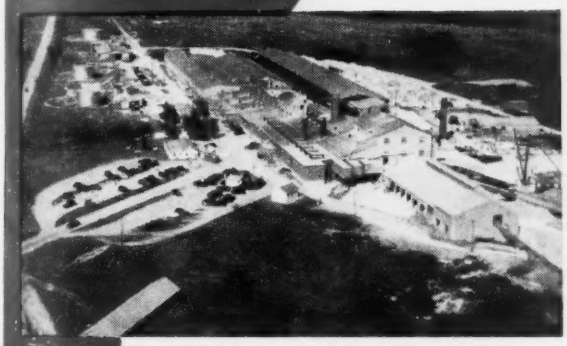
Reading: Progress being made in high-frequency core baking, and a description of dielectric core ovens, occupied the Reading Foundrymen's Association at its Mar. 15 meeting in the Walnut Room, Berkshire Hotel, Reading, Pa. Nat Levin, representative, Girdler Corp., New York, was the principal speaker. H. Earl Blanton, foundry superintendent, Atlantic Steel Castings Co., Chester, Pa., served as moderator of a panel discussion following Mr. Levin's talk.—*W. I. Cassidy.*

Central Michigan: Hart Hotel, Battle Creek, Mich., was the site of the Mar. 16 AFS chapter meeting, with Harry M. St. John, Crane Co., Chicago, speaking on "Brass and Bronze Foundry Practice." Kenneth Rhodes, Engineering Castings Co., technical chairman, introduced the speaker. A lively question-and-answer period followed the address.—*Lewis Heisler, Gale Mfg. Co.*

Northeastern Ohio: B. C. Yearley, National Malleable & Steel Castings Co., spoke on "Casting Defects"

5* LARGE REFRACTORIES PLANTS

DAILY CAPACITY MORE THAN 48 CARLOADS



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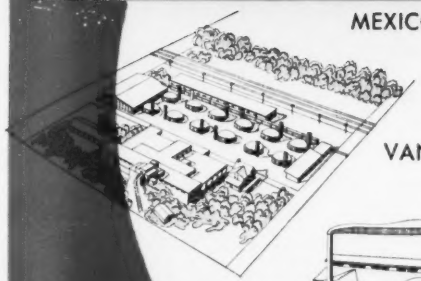
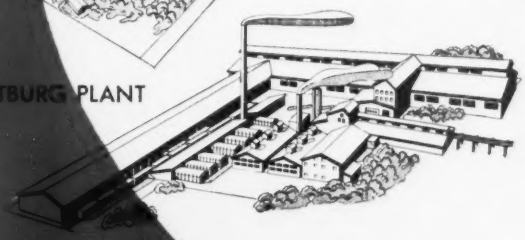
With modern plants located at Mexico, Missouri, Frostburg, Maryland, Van Dyke, Pennsylvania, and Bronte, Ontario, Canada, prompt delivery is routine. Now, with the recently acquired Niles Fire Brick Company, Niles, Ohio, production is not only increased, but speed of service and manufacturing facilities are greatly expanded.



VAN DYKE PLANT



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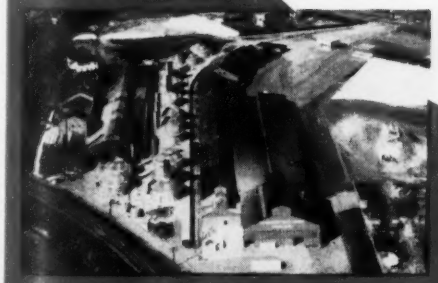

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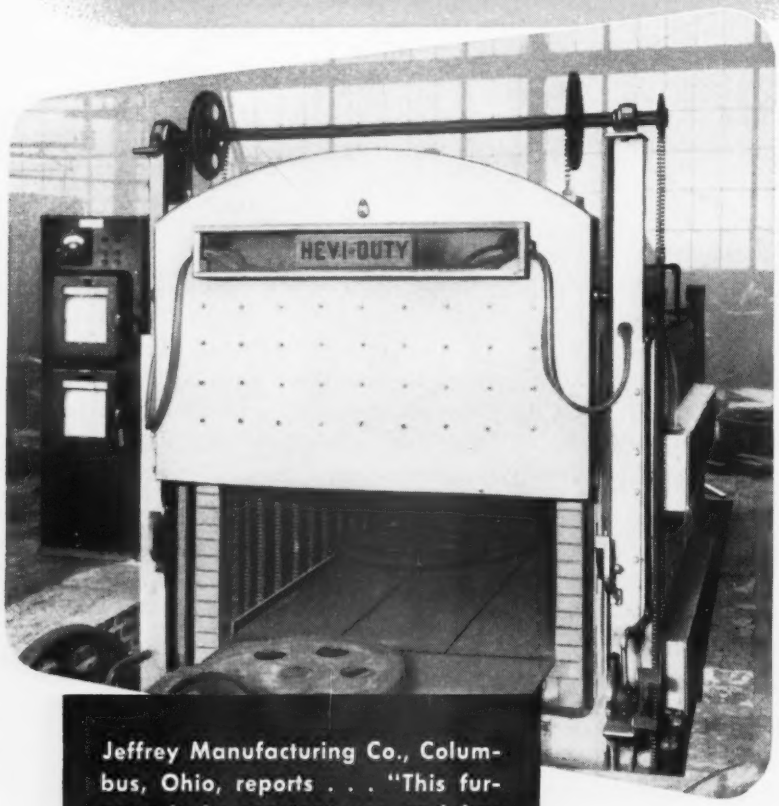
GIVE YOU A WIDE RANGE OF TEMPERATURES
WITH A HIGH DEGREE OF UNIFORMITY . . .



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at the chapter's Mar. 10 meeting at Tudor Arms Hotel, Cleveland. He stated that mechanization of foundries is doing away with the old-time molder who, through experience, learned how to hand-make a mold to minimize casting defects. Today, responsibility for casting quality is placed upon supervisory personnel and, foundry foremen, depending upon their know-how, will make or break foundries in the next 10 years.

In a separate session, the pattern-makers division heard David Kindt, Kindt-Collins Co., speak on "Research —What It Means To Patternmaking." Mr. Kindt reported that the pattern-making industry is on the threshold of drastic change, particularly in the use of plastics as a supplement to wood and metal, and pointed out the need for research on special plastics for pattern purposes. Mr. Kindt explained how research develops and the work and expense it entails, using development of a pattern coating as an example. Other areas in which research has been done include glue, wood impregnators, waxes, woods and other materials. A color film was shown describing how Dupont research developed the synthetic fabric, orlon.—*Robert H. Herrmann and Jack C. Miske.*

Chicago: Officer-nominees for 1955-56 were announced at the Apr. 4 meeting of the AFS chapter. Nominees are James T. Moore, vice president, Wells Mfg. Co., to be chairman, Robert P. Schauss, Chicago manager, Werner G. Smith Co., to be vice chairman, and Daniel R. Jones, sales, Illinois Clay Products Co., to be secretary for a second term.

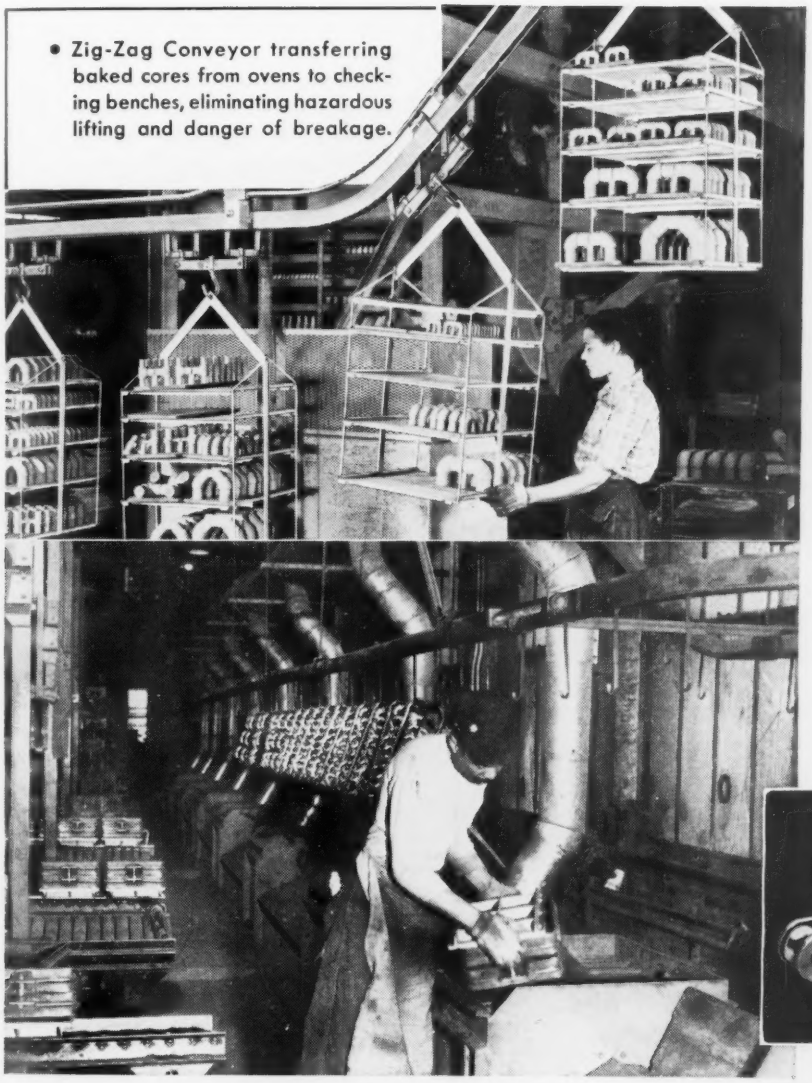
New directors nominated for 3-year periods include W. O. McFatridge, supervisor of foundry laboratory, Manufacturing Research, International Harvester Co.; E. E. Ballard, chief engineer, Lester B. Knight & Associates; H. M. Krueger, superintendent, National Bearing Division, American Brake Shoe Co.; and R. L. Doelman, sales engineer, Miller & Co., current chapter chairman.

Chairman Doelman presided at the general portion of the meeting which was attended by over 200 members and guests. The chapter's educational course, "Molding Methods for 1955," conducted on four Monday nights during March, was attended by an average of 275 at each session.

Four roundtable discussions highlighted the regular meeting. Malleable and Gray Iron Divisions discussed "Production and Characteristics of Pearlitic and Ductile Irons." Speakers were Lyle Jenkins, metallurgist, Wagner Malleable Co., Decatur, Ill.,

Play safe!

Cut handling costs on cores and castings with R-W "Zig-Zag" Continuous Power Conveyors



• Zig-Zag Conveyor transferring baked cores from ovens to checking benches, eliminating hazardous lifting and danger of breakage.

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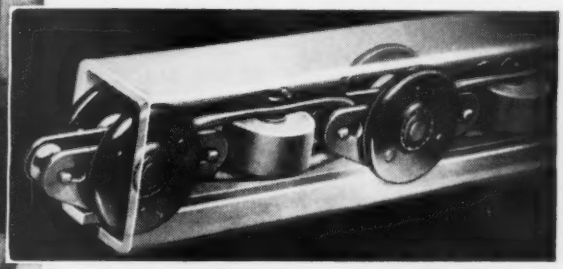
Save money with Zig-Zag

Find out, right now, how *you* can effect greater efficiency, lower costs in your core and casting departments with patented ZIG-ZAG. Write or wire today for consultation. No obligation to you.



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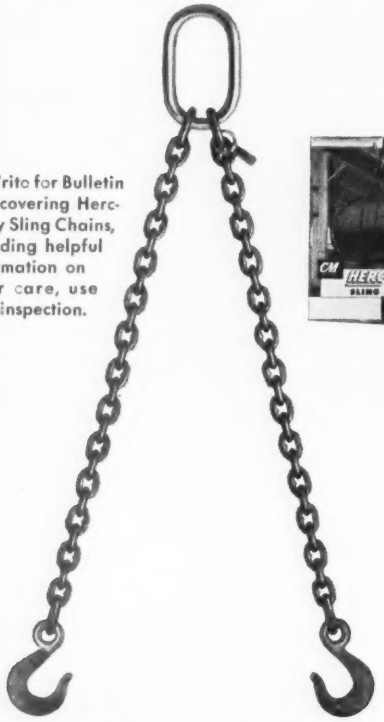

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and Puttnam Volkmar, metallurgist and general foreman, Fairbanks-Morse & Co., Beloit, Wis. Robert Cech, foreman, National Malleable & Steel Castings Co., was chairman.

"Patterns for the Atomic Age" was the subject before the Pattern division roundtable with R. L. Olson, president, Dike-O-Seal Inc., as speaker. Dan Stockberger, Chicago Pattern Works, was chairman. G. W. Anselman, president, Whirl-Air-Flow Corp., Chicago, addressed the Nonferrous division meeting on "Natural or Synthetic Sands." D. G. Schmidt, metallurgist, H. Kramer & Co., presided.

Steel and Maintenance divisions joined efforts to consider "Electric Furnace Operation and Maintenance." George D. Lawrence, assistant contracting manager, electric furnaces, American Bridge Co., Pittsburgh, was speaker. P. R. Gouwens, metallurgist, Fahralloy Co., presided. — *Erle F. Ross*

Bibliography Is Published Of Profit Sharing Works

Sources of information on profit sharing are listed in two new publications of the Profit-Sharing Research Foundation, 1322 Chicago Ave., Evanston, Ill. Most of the important recent works on profit sharing are listed in "A Comprehensive Bibliography of Domestic and Foreign Books and Articles on Profit Sharing." This study lists 226 items. The second work. "Theses on Profit Sharing and Allied Subjects in American Universities," lists 44 theses which can be obtained from local libraries through interlibrary loan service. Both publications can be obtained by writing the foundation.

AFS Surveys Copper Alloys

Latest publication, "Melt Quality and Pressure Tightness of Copper-Base Alloys (A Literature Survey)," has been issued by the American Foundrymen's Society, Golf & Wolf Rds., Des Plaines, Ill. The booklet was compiled under the direction of the Brass and Bronze Division Research Committee.

Factors affecting pressure tightness are discussed, including the causes of unsoundness, methods of avoiding gas unsoundness and other factors affecting melt quality. Other topics described include recommended foundry practice and how to obtain high-quality and pressure-tight castings. A complete bibliography is given. Price of the publication is $1 to members and $1.50 to nonmembers.

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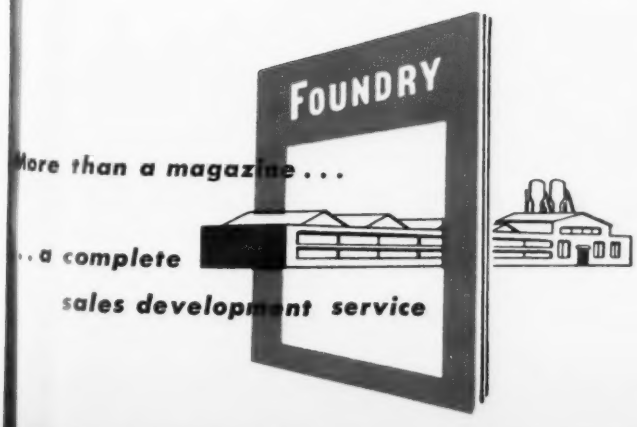

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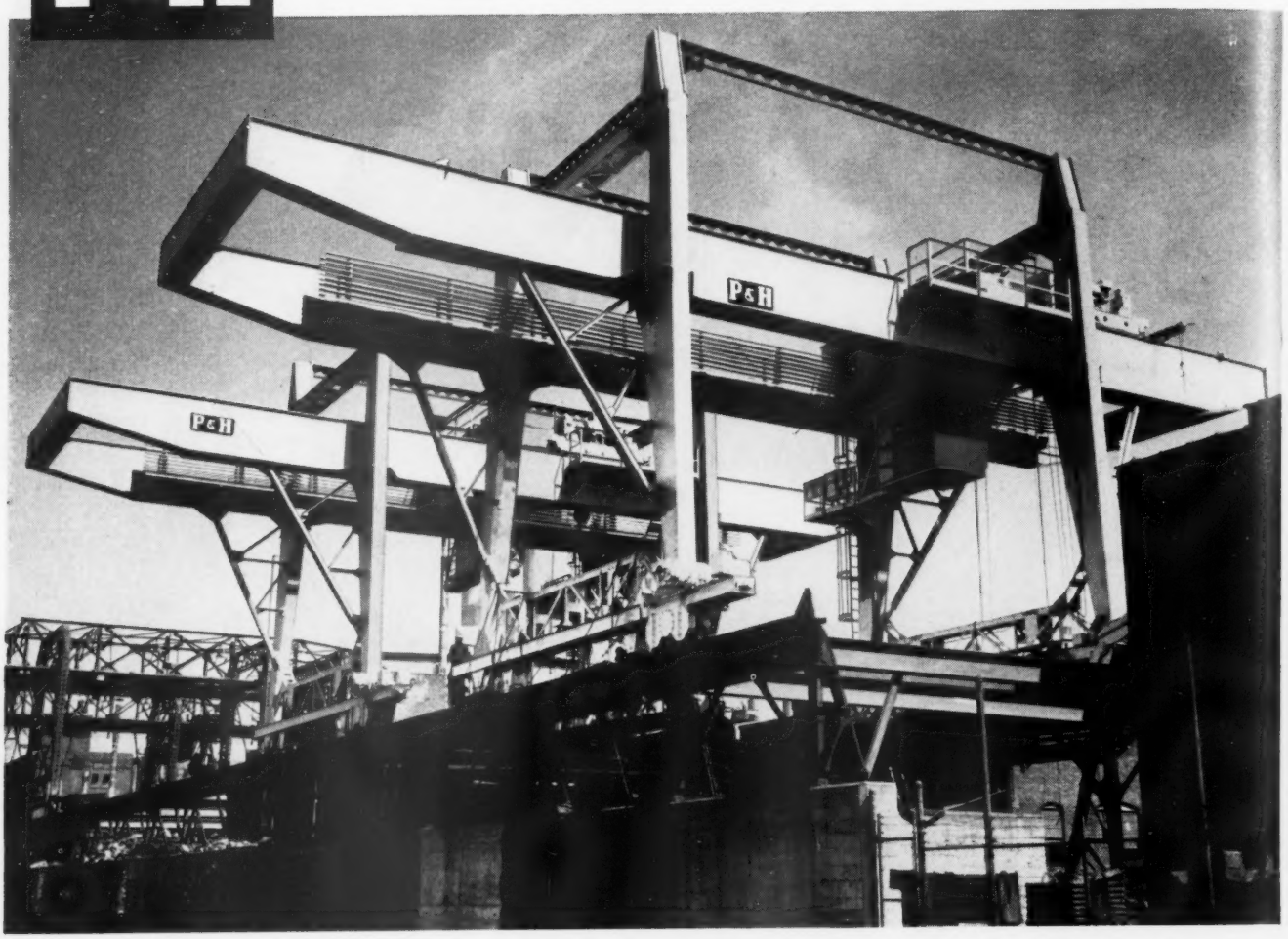

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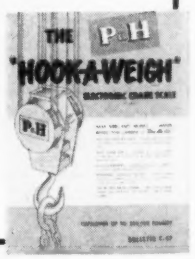

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Book Reviews

Shell Molding and Shell Mold Castings, by T. C. Du Mond, 128 pages, 4 x 7 in., published by Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. Price $2.

Aim of this book is to permit potential users of shell mold castings to evaluate the method and to determine where and how such castings could be used to advantage. It was not the author's intent to prepare a volume that would enable the reader to immediately set himself up in the shell molding business.

The book discusses the process in general, its advantages and limitations, types of castings produced, how shell molding compares with competitive processes, equipment and materials used, a description of typical castings produced in shell molds, shell cores, and costs involved in the process. It is concluded with an appendix of selected references.

* * *

Strength and Resistance of Metals, by John M. Lessells, cloth, 450 pages, published by John Wiley & Sons Inc., 440 Fourth Ave., New York 16. Price $10.

Volume aims to provide the senior or graduate student as well as the design engineer with information on the behavior of metals under stress as it has been revealed by numerous workers in this field. Most of the discussion centers around the behavior of steel but mention is made of nonferrous alloys and cast iron in those particular instances where their behavior differs from that of steel. Tension, elastic-stage modification, tensile properties at elevated temperatures, hardness, impact, fatigue, strain hysteresis, mechanical wear, and theories of strength and working stresses are specific subjects covered.

* * *

Industrial Ventilation, A Manual of Recommended Practice, paper, 8½ x 11 in., published by the Committee on Industrial Ventilation, P.O. Box 453, Lansing 2, Mich. Price $3.

The manual is written for industrial hygiene agencies to provide a single source of most recent data on industrial exhaust ventilation, for standardizing ventilation practices and to train engineers in the ventilation phase of industrial hygiene engineering. The manual can be used as a guide by plant engineers and others interested in the control of atmospheric contaminants in industry and in the comfort of workers. It is intended for practical application and an attempt has been made to avoid detailed discussion. References are provided for those interested in detailed applications.

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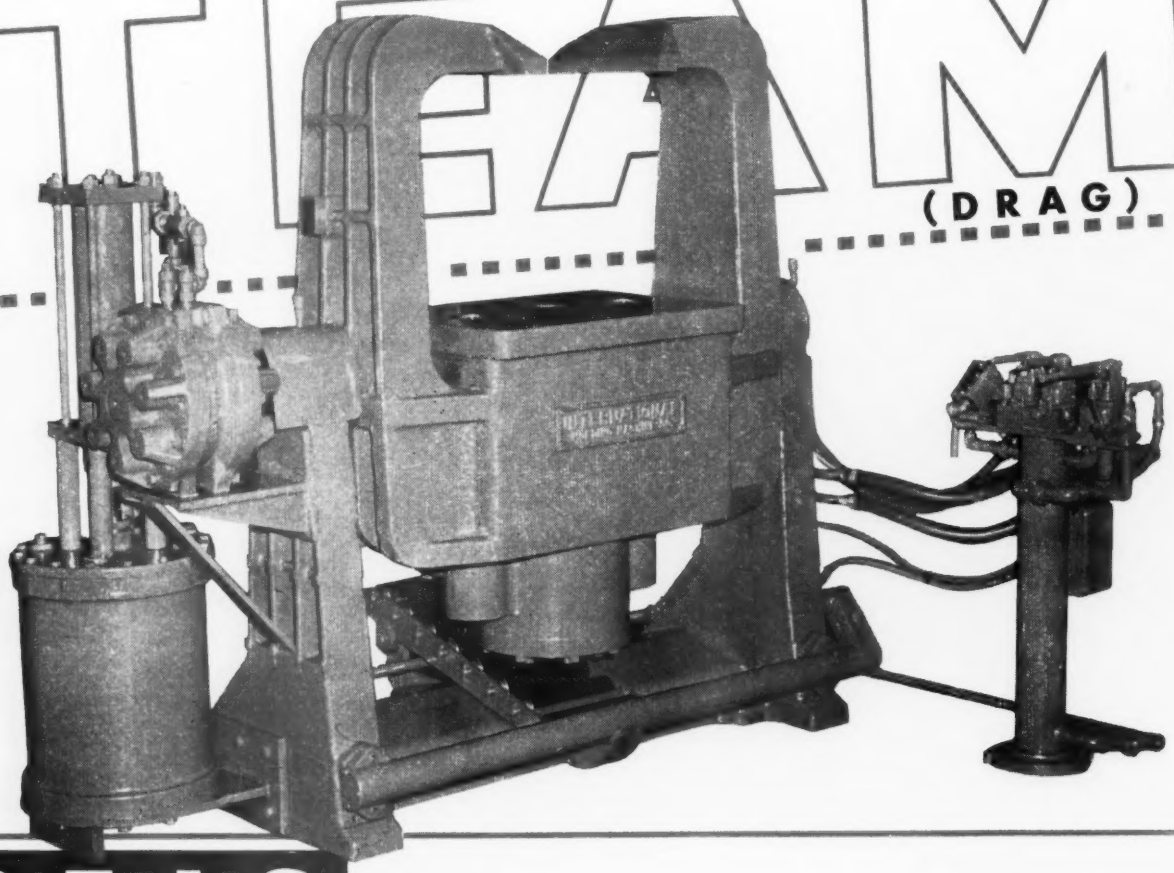

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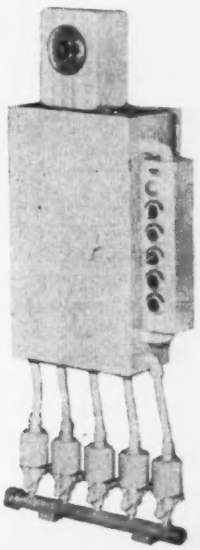

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Throat Destruction in the IRON MELTING REVERBERATORY FURNACE

By CARL G. DE LAVAL
Pittsburgh Alloy Co.
Pittsburgh

REFRACTORY destruction at the throat of an iron melting reverberatory furnace is caused by two important conditions and one surface removal agent. With either of these conditions present, the surface removal agent will do its destructive work. In the absence of both conditions, the surface removal agent is impotent and the refractory performance is good. The two conditions which cause poor refractory performance at this point are a chemically reactive slag and the use of inadequate refractory material for the temperature under which the refractory must perform.

In regard to refractoriness, the condition which permits the refractory surface to be removed is the formation by heat within the body of the refractory of a liquid popularly spoken of as "glass." If the refractory is operated above its safe operating temperature, the binder or the refractory material itself forms a liquid which at too high operating temperatures becomes quite fluid and floats the refractory particles to the refractory surface. In this event, the high velocity of the gases of the combustion products physically erodes the surface of the refractory. This phenomenon can be likened to the difference in the action of a blast of cold air on ice and a blast of hot air on ice. Cold air will not erode the ice; hot air will convert it into a liquid and blow the liquid away, leaving a void.

The other condition, a chemically reactive slag, can be visualized by the action of an acid such as sulphuric acid on steel and the inaction of sulphuric acid on glass.

Revealed in Empty Furnace—The weakness of insufficient refractoriness will show up if the furnace is operated empty at an operating temperature for several hours. In this case, poor refractoriness will be indicated by actual dripping of the "glass" on the surface of the refractory, or a mucky, soft surface will be revealed if the refractory surface is probed with a steel bar. Reactive slag often is indicated by excessive pitting at the slag level or by a straight horizontal cut into the refractory after exposure over a period of hours to this reactive slag.

To solve the refractory problem, first determine with empty furnace testing whether there is softness or dripping on the surface of the refractory. If such is the case, the operator must install a refractory which has higher temperature performance or refractoriness. There is no substitute for the actual test in the empty furnace at operating temperature to determine whether a refractory has sufficiently high refractoriness to do the job.

In estimating the performance of such a refractory, bear in mind that the internal empty furnace operating temperature must be 150° F higher than the desired tapout metal temperature. As an example, if 2700° F metal is required, the refractory installed must be incapable of surface bleeding when held at a temperature of 2850° F for a period of many hours. If a 2800° F taphole metal temperature is desired, the refractory must be capable of operating a 2950° F without any appreciable softening of the surface.

Check the Slag—If destruction of the refractory surface persists after the proper refractory has been selected, in accordance with the above suggestions, the cause is a chemically reactive slag. The operator then must take steps to convert the slag chemically into one nonreactive to the type of refractory in use.

If both conditions are corrected, the velocity effect of the products of combustion will be insignificant.

The throat area has been discussed because it is the poorest performing area in the reverberatory furnace. However, all that applies in the throat area also applies in other parts of the furnace, but to somewhat less extent. The throat arch, for instance, will not be affected much by the slag, but if it does not have sufficient refractoriness there will be excessive formation of fluid "glass" within the refractory. This condition will be evidenced by excessive bleeding, which may have the appearance of icicles or may appear on the hot surface somewhat like melted butter.

It is well to fracture a refractory which has been tested in the furnace and to observe its cross section. The formation of any internal "glass" will be very evident in this fracture. Refractory which is well above the slag line can have considerable "glass" and be soft on the surface without causing any trouble since there is no metal or slag to disturb this surface, nor is the movement of the combustion products sufficient to affect the surface.

Acid and Basic—The above applies equally to both acid and basic operation, with the following additional cautions. Basic refractories are very susceptible to spalling from the thermal shock of periodic operation. This spalling can be minimized only by as steady and prolonged operation as possible or by maintaining overnight temperature by means of a small gas burner. Silica brick, because of certain limitations, is not suitable in this type of furnace and should not be tried. Pure alumina brick should not be tried because of destructive slag reaction.

At this point it again is necessary to emphasize the importance of the two conditions causing refractory failure at the throat and at the same time to call attention to important phases in throat performance during the melt-down operation. It is during the melt-down operation that the destruction occurs, but usually the damage is not observed until after the heat has been completed.

This delay in observation is due to the fact that furnace builders do

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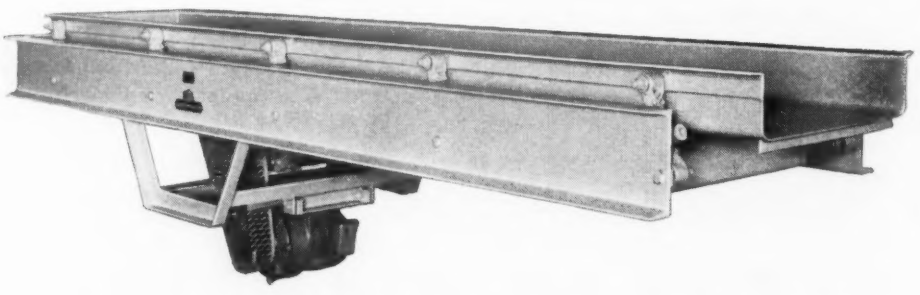

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not as a rule provide openings to observe the throat while it is performing. It is a simple matter to leave out a brick or two in the side walls above the slag line, near the throat, and watch the melting action through colored glasses. When not in use, the hole can be plugged up with high-temperature mortar. Some such observation opening is necessary for intelligent application of corrective measures to poor refractory performance. Only by watching the refractory fail can one establish proper refractory specifications.

The throat functions as a selector orifice. Operating properly, it prevents all solid metal from rolling into the hearth, but allows the liquid metal to do so. At the throat, the metal solids melt off in droplets and driblets. On one side of the throat, the refractory is subjected to extremely high flame temperature. On the other side, the refractory is cooled somewhat by contact with unmelted metal solids. Refractory service men have difficulty in appraising these special conditions properly, since they are accustomed to hearth-loaded furnaces such as air furnaces, electric furnaces and open hearths.

No Melting on Hearth—The reverberatory furnace does not melt metal on the hearth, but should melt only at the entrance to the hearth—in other words, at the throat. If service men could see this throat melting operation, they could select the proper refractory without too much guesswork. The operator must, however, provide the proper slag; otherwise the most nearly perfect refractory will be destroyed. It is believed that this latter is, if anything, more important than actual refractoriness; and proper slag quality cannot be emphasized too strongly.

Internal furnace temperature as a factor in refractory performance has been stressed. This furnace temperature is directly related to flame temperature and combustion efficiency. It is advisable therefore to appreciate theoretical ideal flame temperature possibilities and also actual maximum refractory temperatures attainable with fuel and air. Published data give an approximate theoretical flame temperature of 3550° F for natural gas burned in air and 3600° F for fuel oil burned in air. By painstaking burner adjustment, a stabilized empty furnace refractory temperature (optical pyrometer) of 3140° F was achieved with natural gas and 3250° F with No. 4 fuel oil. Temperatures of this high order not only are unnecessary for iron melting but would be well above the safe operating temperature of most refractories in use. They are cited, however, to

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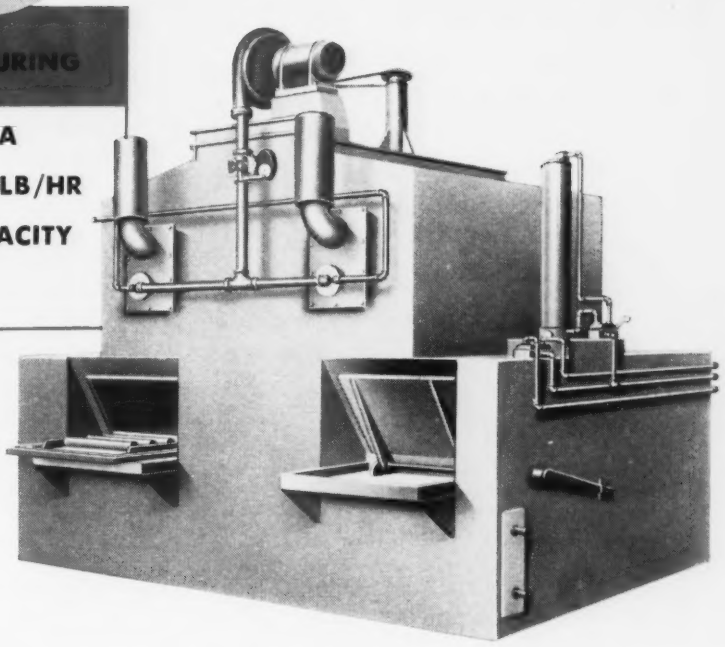

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Quenching is fast and there is no loss of heating time loading or unloading. This arrangement reduces atmosphere gas requirements because vestibule flushing takes place while the stock is being heated.

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indicate the destructive potential of an efficient combustion system unless the system incorporates such limiting devices as fuel and/or air orifices.

The combustion system should be so arranged or adjusted to limit empty furnace refractory temperature to 3000° F. This 3000° F refractory temperature is required for 2800° F or plus tapout metal. If 2600° F to 2700° F metal is desired, the limit should be 2800° to 2850° F in place of 3000° F.

Previously, refractory temperature and slag activity have been discussed separately as though they were not related. The fact is that they are very much related. For example, a nonactive slag at lower temperatures may become quite reactive at a higher temperature; sometimes a rise of only 50° F suffices to bring about severe chemical activity. Also, combustion products at higher temperatures may produce increasingly reactive slag compounds. All of this is to emphasize again the importance of slag and its quality in this type of iron melting equipment. Until and unless proper slags are formed, refractory repair and lining costs will not be reasonable.

This article is prompted by an unofficial survey of more than twenty reverberatory furnace iron melting foundries. The survey indicated a certain amount of refractory maintenance trouble at the throat. The article is written to assist operators in improving their refractory performance. It presents a practical method of proper refractory selection, and if slag practice is correct, too, refractory costs should be reasonable and in line with cupola performance.

Booklet on Air Pollution Covers Metal Melting

Air Pollution Committee of the American Foundrymen's Society, in the interest of assisting the industry in air pollution control, has issued a booklet, "Control of Emissions from Metal Melting Operations." Booklet deals with the general subject of air pollution and its control with descriptions of engineering characteristics of various types of equipment now in service. Typical operating data from installations of several types of equipment are included.

Value of the text is clarified by practical illustrations, tables, and an extensive bibliography. Booklet sells for $1.50 to AFS members, $2.25 to non-members. AFS headquarters are at Golf and Wolf Rds., Des Plaines, Ill.

Photo courtesy: Cooper Alloy Foundry Co.

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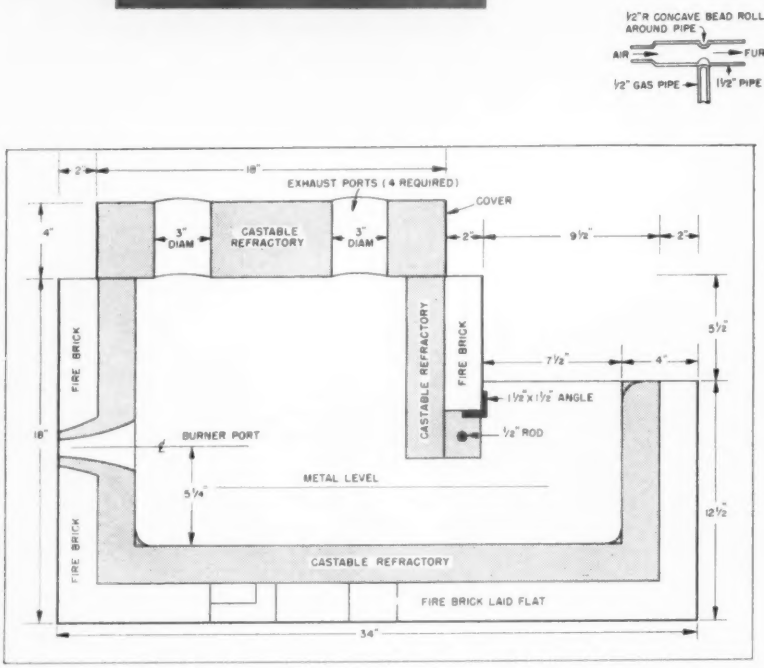
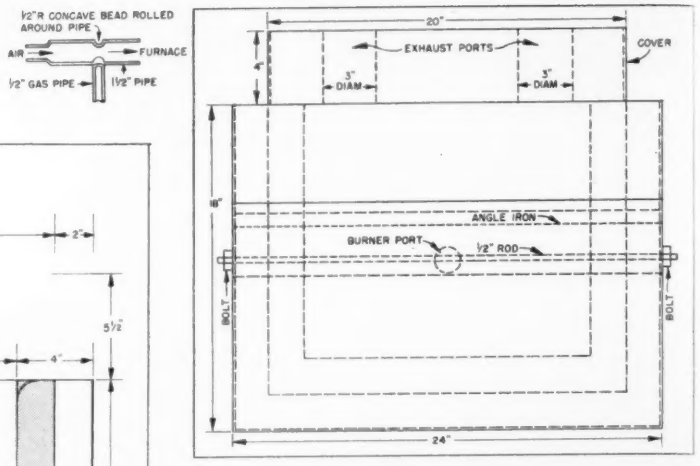
Trouble Shooting

By C. W. AMMEN





Figs. 1 (left) and 2A (above)—Side and front views, respectively, of shop-constructed dipout furnace which will melt about 125 lb of aluminum per hour and consume about 180 cu ft of gas (6 oz, 1100 Btu). Fig. 2B (top left)—Burner is made from a piece of 1½-in. pipe

Dip-out Furnace for Aluminum

DEAR CHARLIE:

As you know, our operation is small and our finances limited. The heart of the operation is cast aluminum components for a manufacturer of inexpensive window fans. This business is seasonal with us, as it is with them. We have been able to pick up some zinc permanent mold work which is not seasonable, but very competitive. Every cent counts. Most of the equipment we have is homemade, but does the work.

At present we are melting both zinc and aluminum in two small, homemade crucible furnaces. We do only permanent mold work and operate no more than two molds at a time. Although we realize fully that a purchased furnace would be the answer, we would like to know whether we could build a small, dip-out gas-fired furnace for this work and whether we also should melt the zinc by this method (open flame). We need a capacity of about 125 lb aluminum in the furnace and a recovery of about 50 lb per hr. We have low-pressure (6 oz) gas with 1100 Btu per cu ft (as per the gas company).

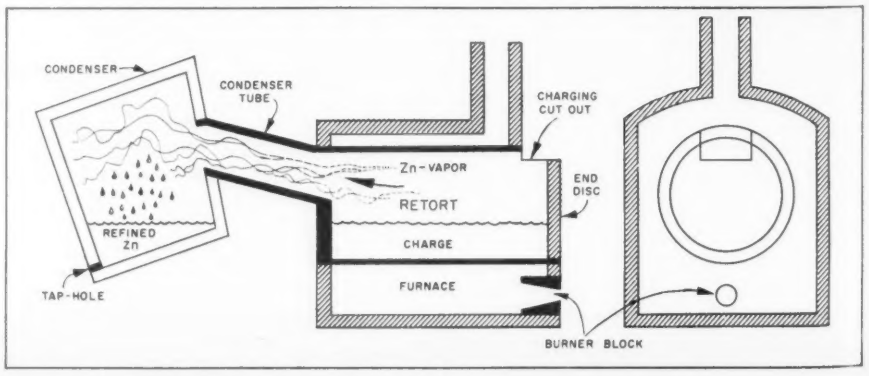
We have been able from time to time to purchase zinc-base scrap, die castings, slush castings, etc., for as low as 3 cents per pound from scrap collectors, but have found that this material is full of impurities, aluminum, etc. Would it be practical, costwise, to refine it into pure zinc on a small-scale basis? How's it done? We understand that it's a simple process with what is known as a straight-sided retort. Hope you can shed some light on this for us. We wish we were larger and had the money to equip with first-rate factory equipment, but this is a hand-to-mouth operation.

Sincerely,
SAM

DEAR SAM:

Do not feel bad because yours is a small operation which lacks equipment and money. This country is loaded with thousands of small foundries, and most of the large shops have grown from small, backyard operations. I have seen some mighty fine castings come from some very small outfits. Also, I have gone into some foundries which looked like a big, hotdog operation from the front and office, only to find that the foundries behind the

Fig. 3—General sketch of equipment setup for refining zinc from scrap by straight-sided retort process. Smelters can do the job much better



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HOW
STATIONARY WHEELS
CAN REDUCE YOUR
PIG CASTING COSTS

Bailey
PIG CASTING
MACHINES

Ideal for use in foundries and small metal producing plants, these machines provide exceptional economy and durability due to a unique design feature. The endless chain carrying the mounds runs over a series of "stationary wheels" mounted on the frame. This eliminates 80% of the moving parts. Results are increased capacity and a substantial reduction in maintenance and operating costs. Furnaces can be tapped direct into the machine—eliminating the furnace-to-ladle operation. Capacities: 3 to 50 tons per hour. Lengths: 15 to 125 feet, in multiples of 5 feet.

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ENGINEERS
LEADERSHIP THROUGH QUALITY
1221 BANKSVILLE ROAD PITTSBURGH 16, PA.

offices were not only small and ill-equipped, but were making topnotch castings by their teeth. By the same token, I have seen some well equipped shops go on the block because of lack of good, sound, basic know-how and supervision.

Oh well, back to the problem at hand. You are right in the belief that factory-built equipment is much better than that which you build yourself; it also costs less in many ways in the long run. A dip-out furnace to give you 125 lb aluminum and a breakdown of about 50 lb per hr is a very small rig, not hard to build, and should not cost much to build. In my running around the country, I have seen several different ways of building these little dip-out rigs. Some are made from a 55-gal drum in the horizontal position with a dip-out well attached to the front. I am partial, however, to the construction shown in Figs. 1 and 2.

This little furnace will give you about 125 lb of aluminum when the melt is about 3 in. deep and will consume about 180 cu ft of gas an hour, using the gas you mention (6 oz, 1100 Btu). The heat should come to pouring temp in about 1½ hr, from a cold start with a new lining, and the time will lengthen as the lining becomes burnt and old. It should not exceed much over 2½ hr. If so, it should be refaced and brought back to size. When properly operating, it should recover about 55 to 60 lb per hr. You will note in my drawings that I left off the legs, which can be angle iron, cut to the desired length and bolted to the shell.

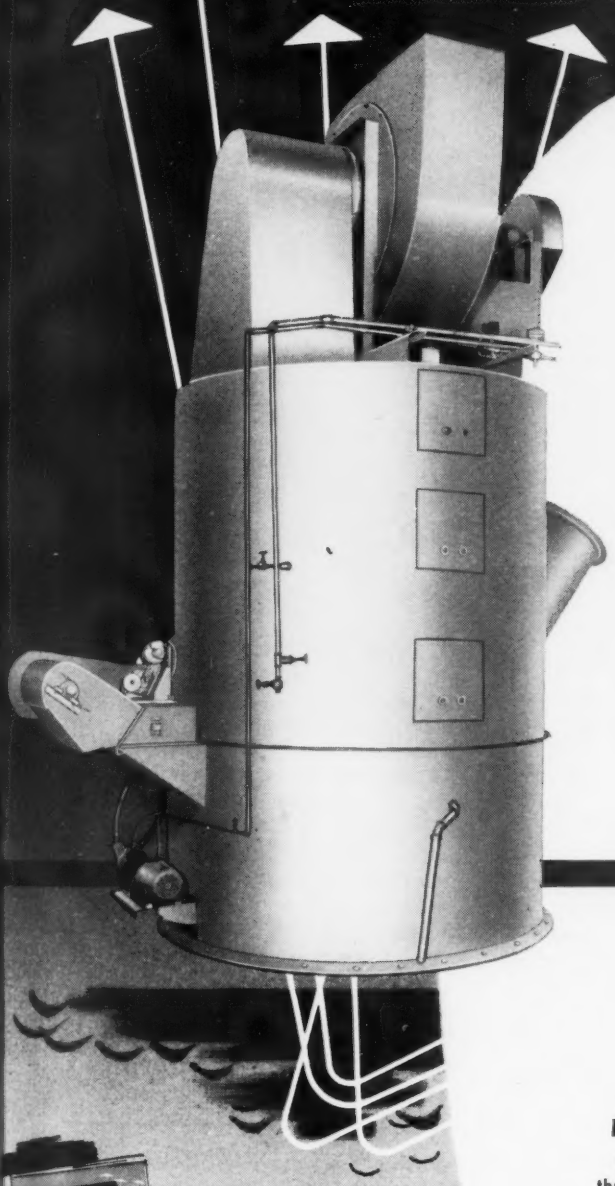
The shell of the furnace should be made of at least ¼ to ⅜-in. black iron, welded construction. The 1½ x 1½-in. angle iron shown, which is used to support the front brick work, can be either bolted in or welded. If you desire, all corner joints can be stiffened with angle iron. The ½-in. reinforcing rod is used to support the castable refractory inner-face lining in the position shown.

After the furnace shell has been completed, give the entire inside and outside a coat with linseed oil and plumbago mixed to the consistency of paint. Allow this coating to dry well before starting the lining. The cover is simply a 4-in. band 18 x 20 in. You can place a few tie rods across it to add strength; also, four pat eyes can be welded in each corner for lifting, if desired.

The cover frame is rammed up with a good grade of castable refractory material. Four, 3-in. diam wooden plugs or tin cans can be

From an old principle of filtration . . .

New HYDRO-FILTER



SIMPLE DEPENDABILITY TO MEET TODAY'S NEED FOR EFFICIENT DUST CONTROL

Here is an entirely new concept of practical dust control. The National Hydro-Filter is basically an air "scrubber", but here its similarity to all existing wet-type dust collection equipment ends.

In taking advantage of the most effective dust control principle known to man . . . that of simple filtration, the Hydro-Filter can promise three outstanding advantages, sought for wherever dust control or air pollution is a problem.

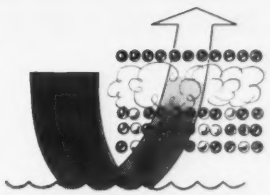
1. EASE OF MAINTENANCE. There are no moving parts within the collection area to corrode or to present periodic maintenance headaches. The unit is entirely self cleaning, on a 24 hour basis.

2. CONSTANT EFFICIENCY. Because of its unique design, the Hydro-Filter will remain efficient under wide variation in dust loads and air velocity. Pressure drop remains constant at about 4" S.P.W.G.

3. SIMPLICITY. Extreme simplicity of operation, construction and design of the Hydro-Filter make it a *tool* for better dust control . . . one that is easy to operate, understand and maintain.

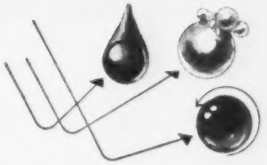
A bulletin giving full details on the National Hydro-Filter, an outline of its development through 6 years of laboratory and field testing; and efficiency reports from present users is available upon request. Write for your copy today.

WRITE FOR BULLETIN *describing the 14 Models of the Hydro-Filter. Available in capacities of 500 to 25,000 CFM.*



MAXIMUM AIR-WATER CONTACT

Dust laden air is drawn upward through a filter bed of glass spheres which is constantly flooded with water. Above the filter bed a violently turbulent area of water, bubbles and mist insure contact and entrapment of dust particles which have not been trapped on surface of glass spheres. Moist air continues upward through a second bed of spheres where near-micron size dust particles and moisture content is removed.



THREE WAY PARTICLE SEPARATION

Unique principle insures dust separation in three ways: Impingement on wetted surface of spheres; impingement on bubble surfaces; entrapment by contact with moisture droplets. Entire collection area is constantly washed down, carrying dust and corrosive elements to a settling tank where automatic sludge ejector rids unit of collected materials.

Dust Collector Corporation

MACHINERY HALL BLDG. · CHICAGO 6, ILLINOIS

used to form the exhaust ports. The furnace proper is lined with one course of standard firebrick or insulating brick over which is swept or rammed a castable refractory, like that used in making the cover, or a plastic refractory. Enough firebrick is left out around the burner port hole in the rear to allow for forming the burner shape. A plug turned to the desired shape makes a very good tool for this. The brick is laid flat, with the 4-in. face next to the shell. Dip the brick in what is called a ½-brick mortar mix. In this mix, the brick floats half way when placed flat in the mortar; at this point it is just about right to lay.

Tap each brick into place with a wooden mallet and make your joints tight and thin. Work the castable refractory or plastic mix as dry as you are able. Allow the furnace to dry very well for at least 24 hr, after which build a wood fire inside and dry for several additional hours. Clean it out, grout any cracks with fire clay and give the entire inner surface a coat of blackstrap molasses over the still warm lining. The molasses will aid in getting a good glaze and increase the lining life. A coat of water glass over the brick sometimes assists installation of the inner lining.

The burner shown in Fig. 2B is a homemade affair, made from a piece of 1½-in. pipe with a vacuum cleaner blower used for air. I would recommend that you purchase a burner and blower if possible. This equipment, along with refractory materials and complete furnaces, can be found for sale by several very reliable sources in the advertising pages of FOUNDRY.

In firing this or any other furnace in which the metal bath exposed area is large with respect to the volume and in contact with the products of combustion, you must watch the condition of flame and metal very closely.

Contrary to most thinking as to atmosphere, you should melt neutral or very slightly reducing in a rig such as this. An excess of oxygen will oxidize the heat completely in short order because of the exposed

PERSONNEL PRACTICES

of Southeastern Foundries

THE foundry industry's employees and its problems are different from those in most other other industries; these differences are reflected in foundry personnel practices. The extent of these differences is reported in a study, "Personnel Practices of Foundries in the Southeast," made by Ellsworth Steele, William R. Myles and Sherwood C. McIntyre of Alabama Polytechnic Institute, Auburn, Ala.

This study covered 31 foundries and 569 other plants in all types of industries. The foundries had a total of nearly 15,000 employees. Effects of size, unionization and the use of organized personnel departments on personnel practices were also investigated.

It was found that foundries differ from other southeastern plants in two of the employment practices surveyed. A greater percentage of the foundries use hiring ages than do the other plants. A minimum hiring age of 18 was given by one-half of the foundries reporting. Relatively fewer foundries use tests in the selection of their employees than do the other plants.

Significant differences were found in wage and seniority practices. Four out of five foundries use piece rate or other incentive plans compared with three out of five of other firms in the area. This is particularly interesting in that a greater percentage of the foundries than of other plants are unionized. The foundries also make greater use of profit sharing plans and job evaluation programs. More extensive use of seniority as a factor in promotion, layoff and rehire was made by the reporting foundries.

A larger share of the foundries have personnel departments, conduct safety programs, have training programs for workers or supervisors and are unionized than are other southeastern plants. The greater use of personnel specialists in the foundry may account for the greater use of safety and training programs. The ever-present danger in many foundry jobs and the difficulty of molding work are probably additional factors explaining the emphasis on safety and training.

The much greater extent of unionization among foundries can be explained partially by geographical factors. Many of the foundries questioned are located in union centers such as Birmingham. The skilled character of the work may also contribute to the heavier unionization of the foundries.

Foundries follow the regional pattern of benefits provided for employees. It is interesting to note that 94 per cent of all foundries furnish first aid, health or medical service of some type and conduct a safety program.

The accompanying table shows how size of the foundry and the presence of a personnel department affect the personnel practices of the foundries surveyed.

Percentages of Foundries Following Various Practices

	Size of Foundry		Has Personnel Dept.	
	1-499 Employees	500 or More Employees	No	Yes
Employment Practices	%	%	%	%
Use tests in hiring	5	45	0	33
Use hiring age limits	74	90	67	88
Wage, Salary and Seniority Practices				
Pay by piece rate or incentive system	74	90	73	83
Have profit sharing program	6	36	0	29
Use job evaluation	47	82	50	67
Use seniority in promotion, layoff, rehire	95	100	92	100
Communication and Related Practices				
Have an organized personnel department	28	91	0	100
Carry on a safety program	90	100	83	100
Have a training program	70	82	55	85
Sponsor a suggestion plan	32	50	17	53
Have a formalized grievance procedure	68	91	50	94
Unionized in part or in whole	65	82	50	84
Employee Benefit Programs				
Provide food service for employees	16	64	17	44
Furnish some first-aid, health or medical treatment	90	100	83	100
Have a group insurance plan	70	100	67	89
Have a credit union	5	45	0	33

You'll get hotter, cleaner Iron with Neville Coke!

NEVILLE Foundry Coke is made from clean, washed coals which contain a high percentage of Pocahontas. These top-grade coals are carefully processed to produce a stronger, denser, more uniform coke with more fixed carbon and less ash and sulphur. It takes a *quality-guaranteed* coke like this to provide maximum temperature at the nose of the tuyere . . . to assure you hotter, cleaner, more fluid iron.

As a merchant producer, operating four batteries of ovens, Pittsburgh backs up this guarantee of *quality* with a guarantee of *reliable, continuing supplies* . . . today and in the future.

So specify *Neville* on your next foundry coke order. You'll *like* the difference!

Specifications of Neville Foundry Coke

Volatile Matter	Fixed Carbon	Ash	Sulphur
.75%	92.5%	6.50%	.58%

Standard ASTM Shatter on 2" screen is 95%. Porosity controlled at 48%.

W&D 5617

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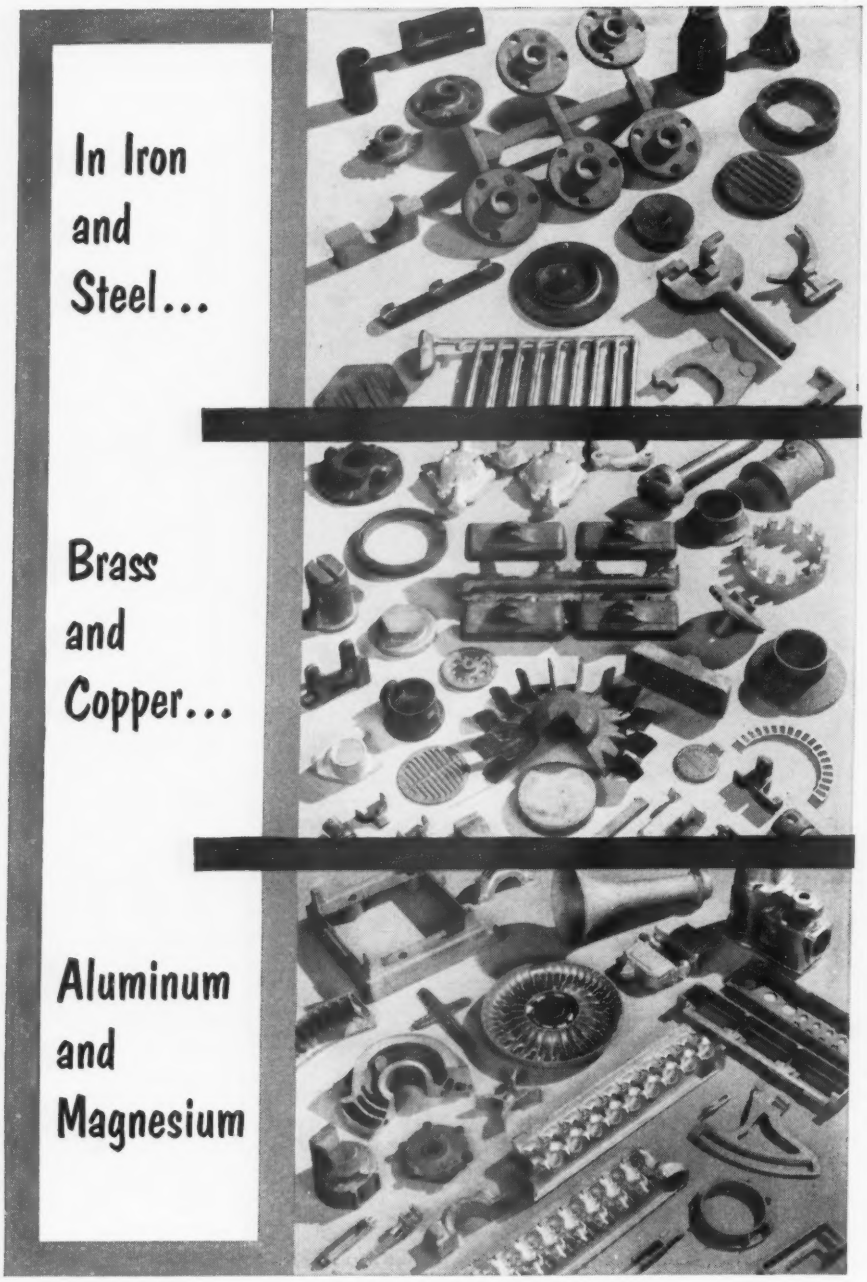


—SHELL MOLDING *comes of age!*

Each of these photos is a mere sampling of castings produced from shell molds bonded with Durez resins. They suggest not only the scope of the new method, but also our broad experience in helping foundries to get the best results with these resins.

You are invited to call freely on our extensive practical knowledge, and to receive — if you do not already have one — the most useful book on shell molding published to date. Write for our 36-page illustrated "Durez Guide to Shell Molding."

DUREZ PLASTICS & CHEMICALS, INC.
1005 WALCK ROAD, NORTH TONAWANDA, NEW YORK

DUREZ — PHENOLIC RESINS — MOLDING COMPOUNDS; INDUSTRIAL RESINS; PROTECTIVE COATING RESINS

SHELL MOLD RESINS THAT FIT THE JOB

area and the absence of a slag cover.

I have seen heats of both aluminum and copper-base alloys removed with a jack hammer because of an oxidized heat. If the skimmed or pushed back metal does not show a clear, mirrorlike surface or if this surface clouds up instantly, watch out: Reduce the oxygen input. You have to oxidize only one heat to make you see the light, particularly with some of these fast melting reverbs in use today that have a shallow bath and a very high thermal input. Thirty seconds will blow up the heat if the oxygen content goes too high. Both aluminum and copper-base heats are too easily degassed to risk complete loss.

I have heard on several occasions the statement that you cannot make good, tight castings with aluminum melted in a rig of this sort, pouring directly from it, but should transfer the metal to holding pots, where it can be properly degassed. This statement is not accurate.

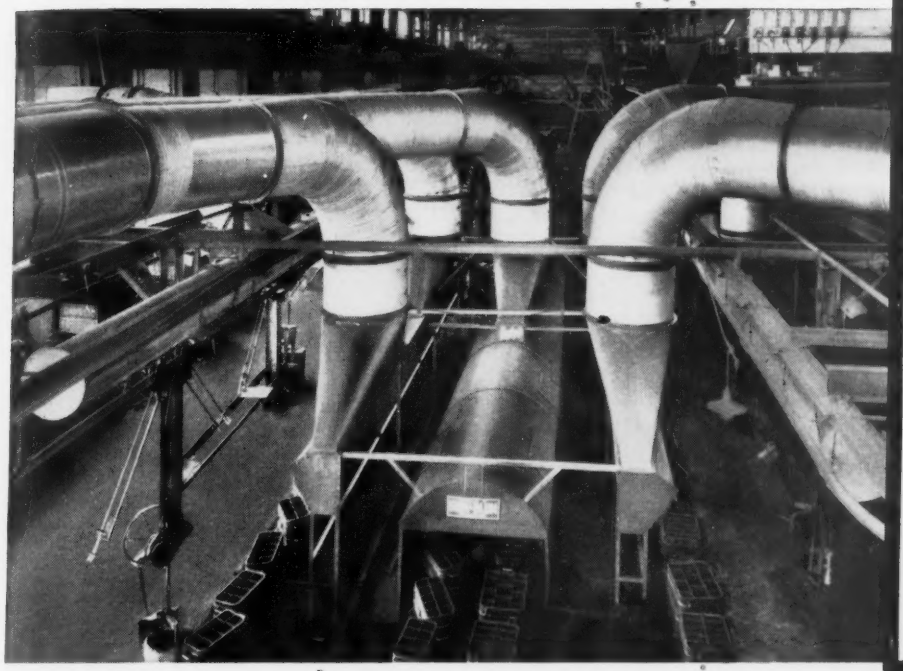
One of the country's largest producers of pistons and aluminum castings for the automotive and aircraft industries pours 90 per cent of all its work directly from open-flame, dip-out rigs—fired slightly reducing. The metal in the well is purged from time to time with dry nitrogen. I had the pleasure of spending several weeks in this plant during World War II, studying the methods of operation there.

As to your question on zinc refining, someone has misled you. It cannot be done on a small basis and takes one heck of a lot of know-how. I doubt that you could come out on top even if the scrap were given to you. The woods are full of ginks who will tell you there's nothing to doing almost anything. Look up good reliable smelters who can supply you with top quality zinc, which is what you should buy. Lay off the scrap. Melt the zinc in a pot-type furnace, using the procedure recommended by your supplier. He will be glad to give you expert advice on the practice to go by. Unless you want to make zinc oxide, don't try melting in an open-flame furnace.

As to how it's done, very generally, the straight-sided retort process is somewhat identical to the bottle-shaped retort process. Fig. 3 shows a general arrangement of the furnace, retort, condenser tube and condenser.

These retorts usually are about 20½ in. ID x 24½ in. OD and 16½ in. long and hold about 3500 lb of Zn per charge. The retort is charged

320,000 CUBIC FEET PER MINUTE!



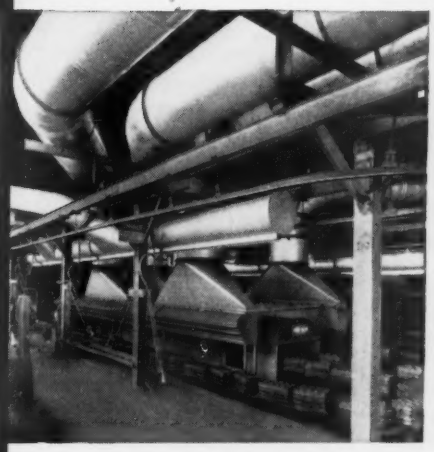
Fumes are really given the air at G.H.R. Foundry, Dayton, O., where Kirk & Blum installation serves 4 pouring lines

A 260,000 C. F. M. exhaust system whisks fumes, smoke, and gases from four pouring lines and two Kirk & Blum smoke tunnels. Offset exhaust stacks clear overhead cranes. A separate 60,000 C. F. M. supply system furnishes outside air for man cooling at the pouring lines.

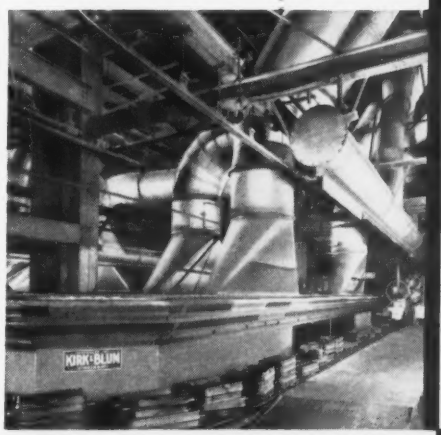
This installation at G. H. R. Foundry, Dayton, Ohio, typifies Kirk & Blum's complete service: Design, Fabrication, and Installation of Dust and Fume Control Systems.

Let Kirk & Blum design a system specifically engineered for conditions in your foundry. Put "Clean Air . . . the Invisible Tool" to work in your plant.

Write today outlining your fume and dust problems.



Fume exhaust system and forced air cooling of working area



Core cooling, fume exhaust and worker cooling arrangement

THE KIRK & BLUM MANUFACTURING CO.
3239 Forrer Street Cincinnati 9, Ohio

KIRK & BLUM
FUME AND DUST CONTROL SYSTEMS

Conversion to Castings

THE NEW, BIGGER MARKET FOR FOUNDRIES!

By simplifying and redesigning existing parts so that they can be cast, aggressive foundries are converting more and more new users to low cost castings. By showing cost cutting advantages to their prospects they are building a whole *new* business for themselves.

Here's a typical example from one foundry:

This part was originally designed as a fabricated assembly, with numerous sub-parts. The foundry redesigned and engineered it as a one-piece steel casting. The result is a stronger part, with more eye appeal and better distribution of metal. *Yet it costs 28.2% less,* delivered as a complete unit, machined and painted.

BEFORE REDESIGNING

AFTER REDESIGNING

In such conversions we can be of real help. Here are just two of the ways Magnaflux can help you get more business by conversion.

First . . . Stress analysis with Magnaflux' Stresscoat* helps you to quickly design castings of exactly the right characteristics for a particular job. By showing stress in parts quickly and positively, Stresscoat insures castings with even stress flow. These are easier to pour, lighter, stronger and better looking.

Second . . . Intelligent sampling inspection with Magnaflux* helps you turn out better castings at lower cost. Magnaflux finds *all cracks* in pilot runs. It helps you determine *why* and *where* cracks occur—whether they are serious—and how to correct the cause before parts are run in quantity and later rejected.

** Magnaflux and Stresscoat are registered trademarks of Magnaflux Corporation*

Ask to have a Magnaflux engineer give you further facts and figures.

Photos and Data Courtesy of Superior Steel and Malleable Castings Co. Benton Harbor, Michigan

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7350 West Lawrence Avenue, Chicago 31, Illinois

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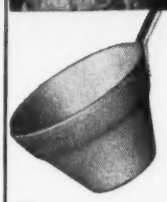
NEW...

- New low prices
- New improved design
- New stock sizes

in

Spincraft ladles



Available with or without handles — in stainless steel and mild steel.

If you pour non-ferrous alloys — now, more than ever, Spincraft ladles belong in your plant. You can select from 23 practical sizes (from ¼ lb. to 30 lb. capacity in molten aluminum) — in top quality stainless steel — for *less* than you've ever paid before.

And . . . experience shows new Spincraft ladles actually cost less to use. Here's why —

Reinforced cup bottom and pouring edge have been spun to a heavier gauge than the weight-saving side walls. This means you get easier handling, better heat transfer, and reduced "burnouts" for longer ladle life. Handles are "whack-proof". Cup surfaces are specially finished to hold any type of ladle coating longer.

Hand any operator a new Spincraft ladle — and the next day try to take it away from him! You'll see how the practical conical shape, the built-in overall balance, minimizes spillage as he "swings" from crucible to machine or mold. Notice how every motion takes less effort. And there's a reason: — for example — a Spincraft stainless steel ladle in the 65 cu. in. size weighs from 2 to 11 pounds *less* than conventional cast or malleable iron, forged or pressed steel ladles.

Order Spincraft ladles for your plant. Cut operator fatigue—pour more metal, for greater efficiency and profit.

Write today for new low prices. Special sizes, gauges, handles and materials will be quoted on request.

Spincraft
SKILL WILL DO IT ®
INCORPORATED

4138 W. State St., Milwaukee 8, Wis.

with about 1000 lb cold metal, and the disk end is placed in position. This end usually is a graphite or clay disk about 4 in. thick on the bottom and 3 in. at the top. This disk takes up the area up to the charging cutout and is slightly smaller in diameter than the retort itself. The space between the two is filled up with a nonheat or air-setting clay. The retort is fired, and when the initial 1000 lb has melted down, the remainder of the charge, which has been melted down in a pot furnace, is poured into the retort. It should be about 2500 lb, giving you a 3500-lb charge as recommended earlier.

Next, the charging cut-out is closed and mudded up. The firing is resumed with a long reducing flame and has a minimum impingement on the retort. The retort is brought up to smelting temperature, about 1700°F, as rapidly as possible. The vaporized zinc goes through the condenser tube into the condenser, which is held at about 790°F by water cooling. This cools the vapor and forms liquid zinc.

Fig. 3 is not to scale and is in no way detailed. It is used only to give you a general idea of the arrangement and process. Generally speaking, retort users guard their operations and little tricks jealously. I do know, however, that it is a very tricky operation, despite its apparent simplicity, and only by much trial and error could you collect any degree of information or have much luck.

Sincerely,
CHARLIE

Book Reviews

Fundamentals of the Working of Metals, by G. Sachs, cloth, 158 pages, 5½ x 8½ in., published by Interscience Publishers Inc., 250 Fifth Ave., New York 1. Price $4.75.

This book presents basic phenomena which determine the performance of metallic materials on mechanical working. They apply equally to the two large commercial fields where working, forming, or plastic deformations are used to arrive at the desired shape of a metallic product, its processing into simple shapes, and the fabricating of these into more complex, finished parts.

The text outlines elementary facts which determine the properties of materials, the functioning of equipment, and the interweaving of operations, providing a technical background to help eliminate losses in material, machine parts and time through lack of such information or faulty procedures.

BLASTRITE

SHOT and GRIT

A complete range of sizes, standard or made-to-order.

CHILLED CAST IRON SHOT & GRIT

For tough cleaning jobs or surface finishing of heat-treated parts.

HI-ALLOY "B" CAST IRON SHOT & GRIT

Hi-strength reduces fracturing due to impact.

MALLEABLE SHOT & GRIT

Best for impact type cleaning machines.

STEEL SHOT (Hardened and Drawn Cast Steel)

Ideal for cleaning and peening where carry-out and abrasive loss are minimized.

CUT STEEL WIRE SHOT (Hard Drawn Cut Steel Wire)

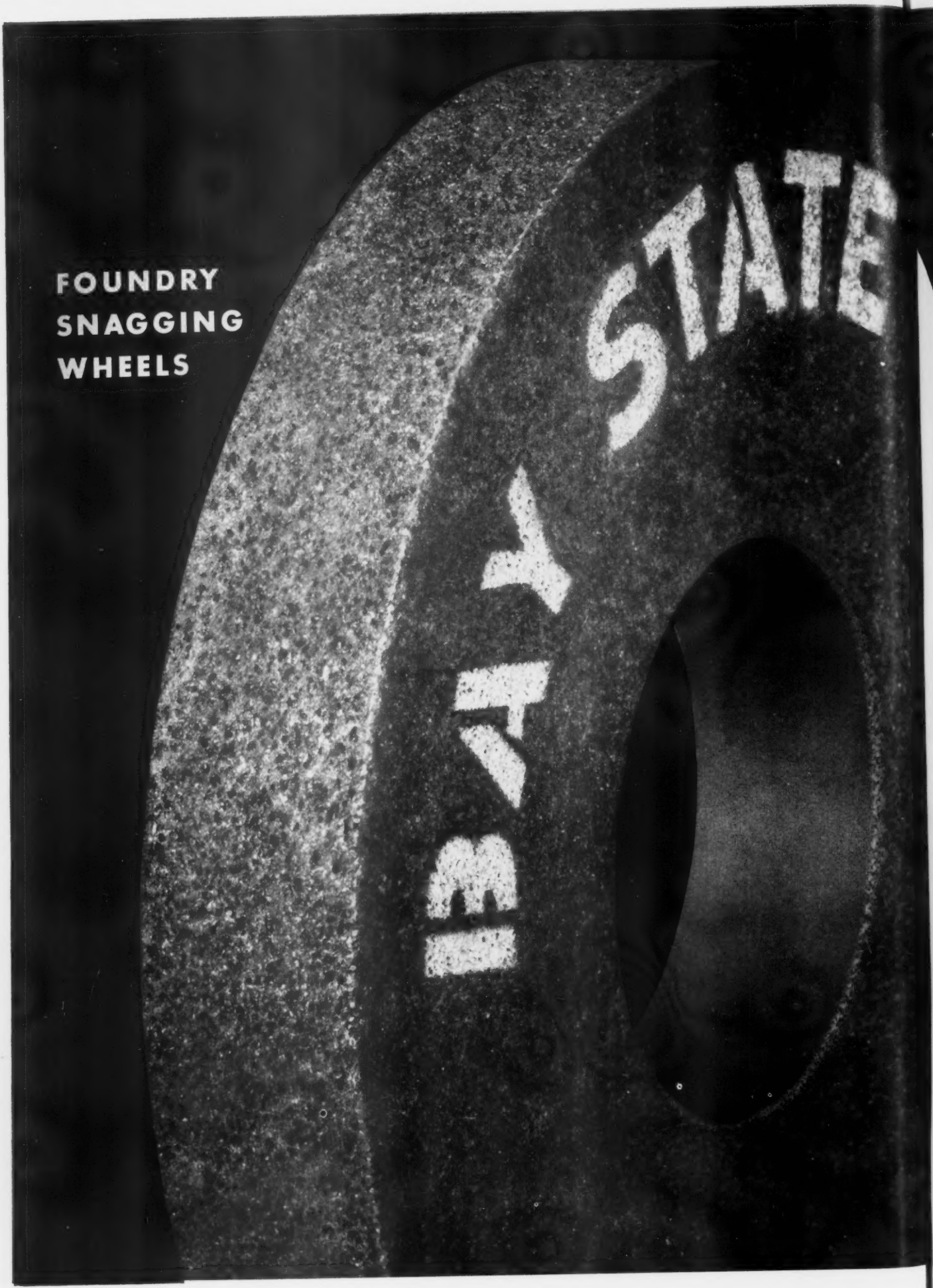
Extensively used in peening springs and other metal parts.

Catalog No. AB-53 will give you further details on these stocked items, as well as those manufactured as ordered.

ABRASIVE SHOT & GRIT CO., INC.

SPRINGVILLE, N. Y.

Telephone Springville 1


FOUNDRY
SNAGGING
WHEELS
STATE

"C8A"

Increases wheel life 100%

"C8A" is a new Bay State abrasive grain combination for snagging annealed malleable and cast iron . . . and beating all competition on job after job.

In one busy iron foundry, for example, 300 — 30″x1-½″x12″ Bay State wheels, with the new "C8A" specification, have been used during the past six months. An exceedingly high-rate of production was maintained with an *increase* of individual wheel life from 30 to *60 hours!*

This case history illustrates Bay State's "doggedness" to keep trying to make a satisfied customer even *more* satisfied . . . because even *before* "C8A" development, Bay State wheels were being used on this job and were snagging more metal per hour than all competitive wheels.

Why not ask for such help on *your* cleaning room jobs? Call your local Bay State distributor. We know you will be pleased with the results.

BAY STATE ®

WHEELS of PROGRESS

BAY STATE ABRASIVE PRODUCTS CO.,
Westboro, Massachusetts, U. S. A.

Branch Offices and Warehouses — Bristol, Conn.; Chicago, Ill.; Cleveland, Ohio; Detroit, Mich.; Pittsburgh, Pa.

Distributors — All principal cities
In Canada: Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ont.

Brass and Bronze Productivity Surveyed in British Booklet

In 1950, a British productivity team representing all sections of the brass foundry industry visited the United States to survey practices of the industry in this country. The British Productivity Council now has published a booklet entitled "A Review of Productivity in the Bronze and Brass Casting Industry" which surveys developments in the field in England as a result of that visit.

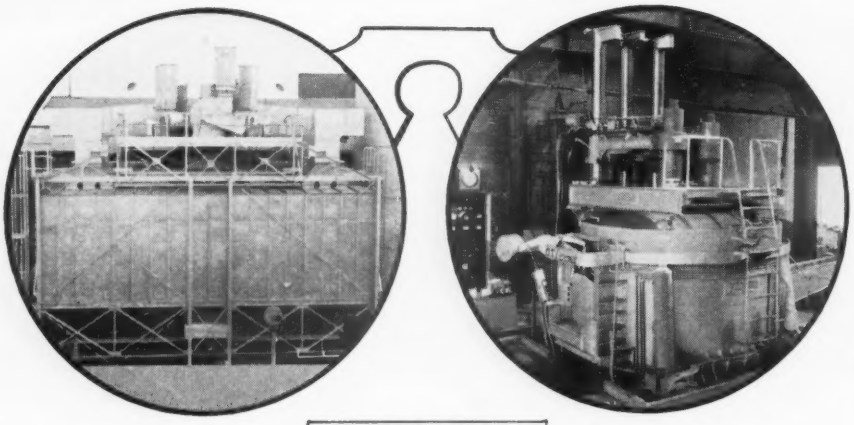
Although the booklet points to great technological progress since the team's visit, it also emphasizes that much remains to be done. The industry suffers to some extent from a lack of large capital resources which has imposed a handicap on developments by certain individual firms: An estimated 75 to 85 per cent of bronze and brass foundries in the United Kingdom employ a labor force of 20 or under. Closer co-operative action is cited as one means of overcoming this difficulty.

The booklet lists several areas which have not been explored adequately by many brass and bronze foundries. These include job simplification (including steps to permit molders to concentrate on one job), mechanization (even to the extent of a few yards of roller conveyor), good costing systems and work study. It also points to the need for better housekeeping and public relations as a way to attract capable workers.

The 40 pages of the booklet are divided into two sections, the first of which covers areas which lead to greater productivity and the second an analysis of nearly 20 representative firms which have increased their productivity.

Copies of the booklet are available from the council, at 21 Tothill St., London, S.W. 1, for 2s. 3d. each.

SLY controls emissions from STEEL FOUNDRY



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LOS ANGELES STEEL CASTING COMPANY

With an eye to cleaner plant operations, Los Angeles Steel Casting Co. has installed Sly dust collection equipment on four electric melting furnaces.

This firm's dynamic president, Mr. Carleton B. Tibbetts wrote, "This equipment is fully automatic and besides being completely effective and practically 100% efficient in removing all dust from the air stream, it also, by means of its shaker and reverse air mechanism, restores itself constantly to operating conditions without the need for manual cleaning whatsoever."

Since 1874, Sly has pioneered and developed positive dust collection equipment . . . the original patentee of the cloth type filter more than 50 years ago.

If you have a dust problem, let's talk it over. Possibly our long experience could mean a big saving to you.

Manufacturers of: Dust Control Systems, Blast Cleaning Equipment, Tumbling Mills, Industrial Ovens.

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PIONEERS AND LEADERS IN INDUSTRIAL DUST CONTROL

Industrial Defense Plans Are Outlined in Manual

Complete plans for industrial defense are found in an industrial defense planning manual published by the American Iron & Steel Institute. Topics covered in this 48-page book include administration, personnel, security, communications, training, medical and rehabilitation. Additional information is found in the several appendices. This manual, written especially for the iron and steel industry, includes a map showing extent of H-bomb destruction. Single copies of the manual can be purchased for 50 cents from the American Iron & Steel Institute, 350 Fifth Ave., New York 1, N. Y. Copies in quantity may be made available at a special rate.

Movie Shows Conveyor Jobs

Installations showing the scope and variety of jobs done by conveyors are depicted in a new 20-minute motion picture "Movement Is Life," sponsored by the Conveyor Equipment Manufacturers Association, Washington. The script tells how mechanical handling by conveyors increases employment and profits and raises the standard of living. Prints of the 16-mm movie may be borrowed from Modern Talking Picture Service, 45 Rockefeller Plaza, New York.

Kodak Revises Information

Spectrographic analysts are provided new information in a revised booklet published by the Eastman Kodak Co., Rochester 4, N. Y. Revision of the reference booklet, "Kodak Materials for Spectrum Analysis," was re-

proven material handling power

with TORQUE CONVERTER DRIVES

6 PAYLOADER TRACTOR SHOVELS

FRONT WHEEL DRIVE

MODEL HA — Completely new model — twice the digging, carrying and lifting capacity. Exclusive 40 degree bucket break-out at ground level. Digs, carries, dumps and spreads bulk materials — indoors and outdoors. Unloads box cars of bulk materials. 18 cu. ft. bucket capacity.

MODEL HAH — a larger front-wheel-drive model with 24 cu. ft. bucket capacity. Large, 12"00 x 24 inch pneumatic tires on drive wheels give tremendous traction on or off pavement. Rear-wheel power steer insures easy operation and fast maneuvering in close-quarters.

REAR WHEEL DRIVE

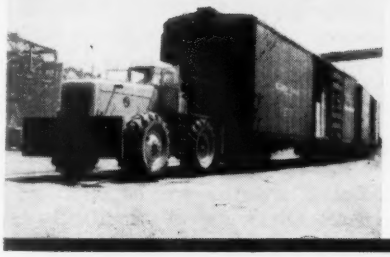
MODEL HFC — This "PAYLOADER" with 1 cu. yd. bucket capacity is a popular, well-proven model especially for outdoor use. Rear-wheel-drive enables it to dig and grade as well as load trucks, carry and stockpile. Travel speeds up to 19 m.p.h.

MODEL HFHC — This extra high-lift "PAYLOADER" can dump its loads over bin edges up to 11½ feet high. Especially popular for loading and handling coal and other light materials into high trucks and wherever high lift and long reach are desirable.

FOUR WHEEL DRIVE

MODEL HM — This pioneer 4-wheel-drive tractor-shovel with 2 cu. yd. bucket is the largest in the "PAYLOADER" line, with an enviable reputation in construction, raw materials and manufacturing industries. Rear-wheel power-steer makes it maneuverable and easy to handle.

MODEL HR — Provides the many advantages of 4-wheel-drive in a smaller machine. This 1 1/3 cu. yd. machine has proven as popular as the bigger HM and has the same features, including 4 speeds both forward and reverse and rear wheel power steer.



3 PAYLOADER TRACTORS

MODEL TM — A big, 4-wheel-drive tractor with 15,000 lbs. drawbar pull. Has effective traction to work on pavement, snow, sand and mud. Used for switching and spotting cars—walks easily across tracks. Can be equipped with railroad couplers, air brake control, etc.

MODEL TU-90 — Another 4-wheel-drive tractor with power steer. Pushes or pulls in either direction. Only 5 feet high; 12 feet long. Will handle large aircraft easily — has 9,000 lbs. drawbar pull.

MODEL TC-60 — A powerful, compact tractor with 6,000 lbs. drawbar pull, yet less than 10 feet long. Rear wheel drive on dual tires; front-wheel power-steer; speeds up to 17 mph.

Full-reversing transmissions plus torque converter drive feature all these famous "PAYLOADER" tractor-shovels and tractors — give them maneuvering speed, ease of control and a wide choice of operating ranges.

Each "PAYLOADER" is a proven unit, made by the tractor-shovel pioneer that has built more wheeled tractor-shovels than all others combined. And "PAYLOADER" units are sold by an experienced, well-established Distributor organization having complete parts and service facilities that protect your "PAYLOADER" investment.

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Please send information on the complete line of "PAYLOADER" tractor-shovels and tractors.

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Company _____

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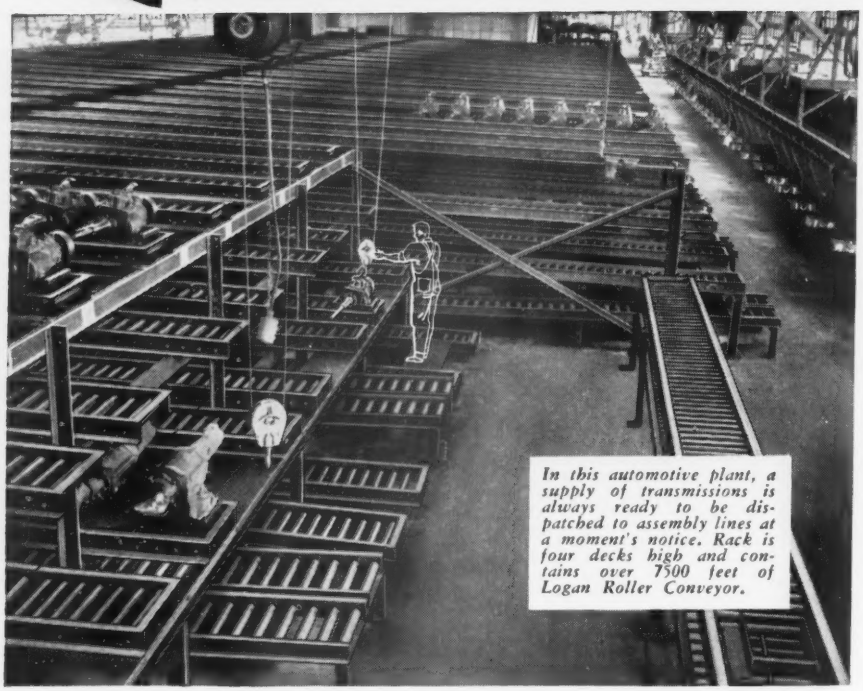
City _____

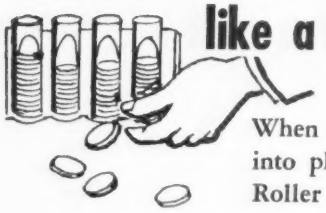
State _____

ROLLER CONVEYOR
STORAGE RACK



In this automotive plant, a supply of transmissions is always ready to be dispatched to assembly lines at a moment's notice. Rack is four decks high and contains over 7500 feet of Logan Roller Conveyor.

Material always ready,



like a bus-man's coin bank!

When a piece is removed — another slips into place! That is the principle of Logan Roller Conveyor Storage Racks. Advantages:

(a) Eliminate confusion and hazards which frequently accompany use of skids and trucks. (b) Save aisle space required for trucking. (c) Stock always ready on first-in-first-out basis. (d) Material flows by gravity. (e) Quick visual check of stock at all times. (f) Save steps, time, money.

Adaptable to hundreds of different products in many industries. Perhaps there is an application in your plant. Write for further information, or for nearest Logan engineer.

LOGAN CO., 580 CABEL ST., LOUISVILLE, KY.

Logan Conveyors

quired by improvements in the materials, especially in increased sensitivity. General properties of films and plates and a discussion of emulsion types and sensitizing classes are included in the booklet which can be ordered through Kodak dealers. Price is 50 cents.

Iowa State Schedules Course In Management for June

The 16th Management Course of the College of Engineering, State University of Iowa, will be held June 13-25, 1955, in Iowa City, Iowa. The areas of production planning, job evaluation, motion and time study, wage incentives, plant layout, materials handling, quality control, supervisory training, labor relations and legislation, organization and policy, and public speaking are included in the intensive course of instruction.

Regular State University of Iowa teaching staff will be augmented by outstanding men from a variety of industries and other educational institutions. Communications concerning the course should be sent to J. Wayne Deegan, 117 Engineering Bldg., State University of Iowa, Iowa City, Iowa.

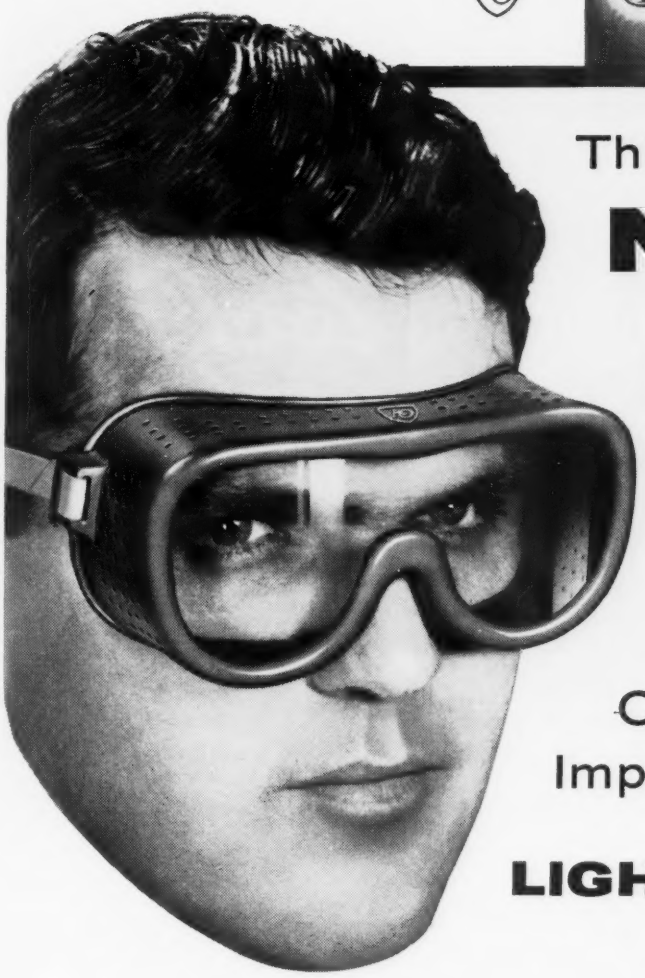
Ways To Eliminate Paperwork Are Given in New Leaflet

Elimination of up to 60 per cent of paperwork costs and a one-third reduction of present business records are possible if a business owner or proprietor adopts an efficient system of records management states a publication of the small Business Administration. First of a new series, the leaflet explains the goals and benefits of records management. The leaflet, "Records Management in Smaller Stores," may be obtained upon request from all Small Business Administration field offices.

Films Describe V-Belt Drives

Three slidefilms about v-belt drives are offered by Allis-Chalmers Mfg. Co., Milwaukee 1. "In Every V-Belt Drive," covers the engineering principles basic to v-belt drives. "For Better Driving," deals with the installation and maintenance of multiple v-belt drives. "Selecting a Drive" tells how to check characteristics to find the best type of drive. Requests for showing of any of these slidefilms should be made to the nearest Allis-Chalmers General Machinery Division district office.

Eye Protection



This

NEW FLEXIBLE MASK GOGGLE

Offers Excellent Impact Resistance!

LIGHT...COMFORTABLE INEXPENSIVE

Here's our new moderately-priced No. 482 Flexible Goggle of the single aperture mask type. It's light in weight — fits the face snugly and comfortably with a cushion-like effect. Extra wide and with ample clearance, it can be worn over most types of personal glasses or Safety Ry glasses. The interchangeable one-piece acetate lens is *optically correct**, and offers superior resistance to impact.

While made of a soft plastic material for flexibility, frame is solid and fits facial contours closely for full protection. There is an unusually wide field of vision for worker comfort, safety and efficiency.

Lens is easily removed and replaced and is available either clear or in green acetate. Elastic headbands are easily adjustable.

Goggle can be adapted for use as a chemical goggle by eliminating perforations in frame and fitting with vinylite lens and adjustable plastic headband. It is resistant to acids and alkalis. When ordering for chemical use please order as No. 484 or 485.

No. 482 Clear Frame, Clear or Green Lens

No. 483 Green Frame, Clear or Green Lens

No. 484 Chemical Goggle, Clear Frame, Clear or Green Lens

No. 485 Chemical Goggle, Green Frame, Clear or Green Lens

RECOMMENDED USES:

For protection against flying particles striking from any direction, on such operations as babbitting, chipping, cutting rivets, light grinding, on hand or machine tool work, or in occupations where spark or explosion hazards are present.

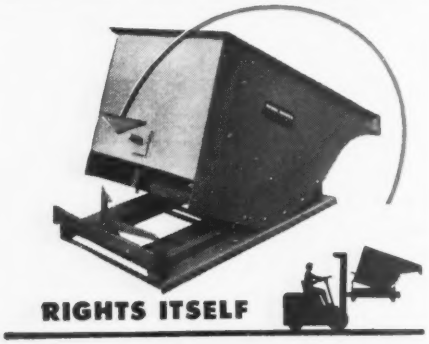
†T.M. Reg. by American Optical Company

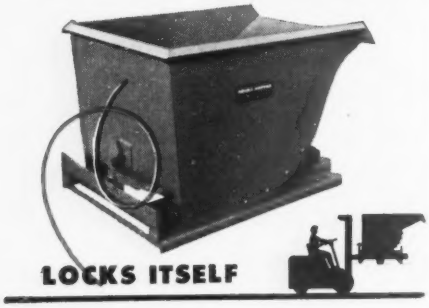
American Optical

SAFETY PRODUCTS DIVISION

*The AO trademark, and the engineering and research in back of the trademark, are your assurance of optically correct eyewear with every AO goggle.

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES





pays for itself!

It's the safe, sensible, economical way to handle wet or dry, hot or cold bulky materials. Simple, one-man operation does the job with amazing speed . . . *cuts cost of hand unloading by at least 50%.*

This rugged Roura Self-Dumping Hopper is built to withstand the terrific knocks and bangs of rough usage. Extra heavy gauge metal and welded construction mean years of dependable service. Fits any standard fork or platform lift truck. Also available mounted on live skids or with malleable or rubber tired casters. Sizes from ½ to 2 cubic yards. Thousands in use in America's biggest industries.

ROURA
Self-Dumping
HOPPER

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ROURA IRON WORKS, INC.
1417 Woodland Ave., Detroit 11, Michigan

Meditations of a Sandman

By HAROLD S. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

"The Cost"

THAT sage old Scotsman who observed, "Nowadays ye git nothin' fer nothin', an' mighty little fer sixpence," was expressing an opinion that seems to be universally accepted. Everything has its price, even to the "wages of sin." Ralph Waldo Emerson stressed the point in various of his essays, and in "Compensation," it became the entire theme. The word "cheap" means not only low in price, but also "worthless." We may not always get the best, even at a high price, but when the price is too low, someone is certain to be cheated! This axiom applies as forcibly to foundry experience as to anything else.

Most foundrymen agree that a cheap casting is precisely that. We prefer to say inexpensive. Let us momentarily consider the example of shell molding, for we are still talking sand. The claims for castings made by the shell process generally are conceded to be somewhat extravagant. This opinion emanates from many of those who are now engaged in shell molding, not from me.

Is the shell-molded casting expensive or inexpensive? As usual, there are two schools of thought. Let us first consider the case for shell castings. Its proponents insist (or at least some of them do) that tolerances can be maintained to as low as 0.005 in., thus greatly reducing and in some cases eliminating machining, which is expensive. Economies are effected because a comparatively small amount of sand and binder is required and no heat is wasted in drying the mold or core. Permeability is ideally controlled, and insulation is such as to improve metal texture. It would appear to be a far cleaner operation than conventional green sand molding, with a decided conservation of space. There are probably other favorable considerations with which I am unfamiliar.

If you're looking for **SOMETHING BETTER -**
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Famous for Quality and Accuracy.
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You'll Like Our Service, too.
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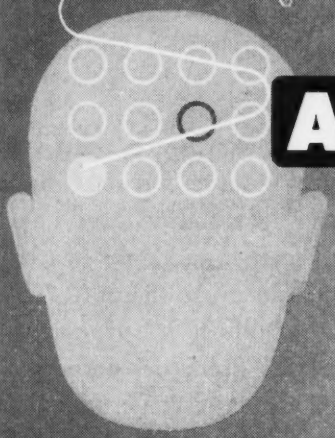

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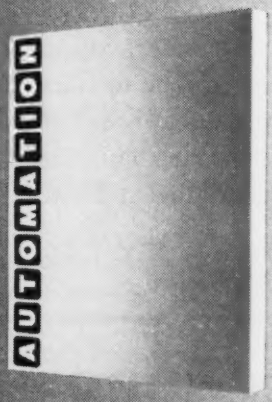

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- won't break with rough handling—use your Edco Dowmetal Bottom Boards over and over again . . . they're *permanent* equipment.
- minimum heat retention due to great heat conductivity and radiation which results in rapid cooling.
- increase scrap savings by helping to produce castings true to pattern.

Wood Bottom Boards char, warp, burn easily. Metal boards are heavy; steel boards are unwieldy, costly to handle. Iron boards (even heavier than steel) crack or break if suddenly heated or cooled. Aluminum boards are difficult to clean, often crack because of abuse. And cemented Asbestos-type plates will break at corners and edges. The expense of an under-structure is often required too.

For safe, easy-to-handle, permanent equipment in your foundry, remember this fact: each of the 83 *standard* Edco sizes is constructed of magnesium alloy. Call Edco first next time you need "the right Bottom Board."

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Now, is there a case against shell molding? Frankly, I think not. I believe that many of the present objections will be overcome and that costs will be reduced as the over-all technique is improved. I feel that castings made by the shell process will create an expanding market, but I also believe that perfecting this process will be costly, both in money and human energy. The shell molder's path will not be rose-covered, and his nights will not be untroubled. If and when larger and larger castings are made in shells, the problems involved will in all probability be fully proportionate to the size of the castings.

I think our shell men fully appreciate this fact, and most of them face their future undaunted. Those who plunge into this new casting method in the belief that it is an end to all their casting troubles, that the era of green sand molding is doomed, will, I am sure, find themselves disillusioned.

Those who believe that shell molding has a dubious future argue that its claims have been overdramatized and bear little resemblance to present performance, that promises of close tolerances without machining have in most instances not been fulfilled, that cost of equipment and materials is high and man-hour production disappointing. They also complain of the tendency of these castings to warp. If they have other objections, I shall ignore them here, for it is not my purpose either to praise or condemn the shell molding process.

I discuss it merely to point up my belief that in the final analysis quality in commercial castings must be gaged by cost. I have been thrilled by the beauty of shell castings: I have been frightened by the apparent cost. But then of course I've always been a coward where money was concerned.

Yet somehow I have the feeling that if we who have struggled so much with our green sand practice were willing to open our purses a little wider, to purchase precision patterns and coreboxes and other expensive sand and equipment comparable to that demanded by the shell molder, the present gulf between the two methods might be narrowed visibly. Here again, we get approximately just about what we pay for.

Sand Control—I know of several foundries—in fact I work in one now—where for years we knew that we were without even the pretense of sand control. Each night clay or new sand was scattered over the shakeout sand in amounts which

CAPTIVE MOISTURE INSURES BETTER CASTINGS

REDUCES COST!

And here's why! When sprayed on green or dry sand molds, cores, chills, matchplates, sprues or inserts, PARASPRAY provides a tough, moistureproof surface that completely *stabilizes* moisture content. The result—moisture content is held inactive with absolutely no loss, no gain. Molds retain their full strength, can be safely stored for days before pouring. PARASPRAY saves time, too, because it dries within seconds after application. It prevents washes, creates a deoxidized atmosphere, stops "burn-ins" with a thin carbon film formed between sand and metal.

ONLY PARASPRAY STABILIZES MOISTURE SO EFFECTIVELY

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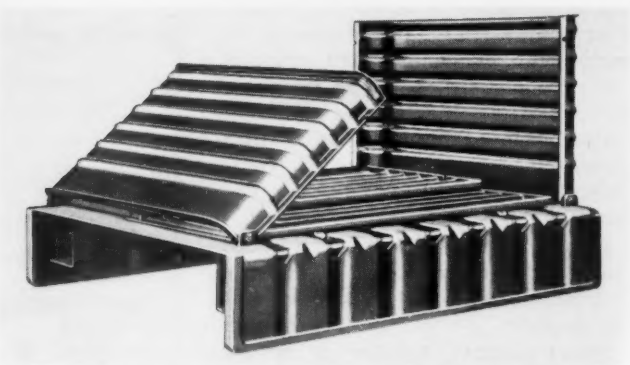
IF YOU NEED HELP

MOLDING EFFICIENCY CAN BE IMPROVED in your foundry through the ease of operation, handling and long trouble-free service of Republic Foundry Flasks. They can be designed and manufactured in various sizes and gages to meet your individual requirements.



SAVE UP TO 66% OF YOUR STORAGE SPACE with Republic Collapsible Boxes. This PB-127 unit solves the problem of storing and shipping empty boxes. It's designed for heavy-duty service. Can be tiered when loaded or empty —collapsed or set up. It is a one-piece unit. Pin and slide bolt assures positive locking.

on any of these

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- ✓ improving castings
- ✓ reducing costs
- ✓ increasing output
- ✓ molding practice
- ✓ improving efficiency

CALL IN A
REPUBLIC PIG IRON METALLURGIST

His job is to help you solve foundry problems. Or to furnish quick, accurate answers to questions on molding practice, improving castings or cutting production costs.

Frequently he is called in to make a routine foundry survey. His recommendations and suggestions often result in improved operation, increased production efficiency and unit output with no increase in overhead costs.

The Republic Pig Iron Metallurgist has a solid foundry background gained from years of actual experience—plus a thorough knowledge of all types of pig irons and their characteristics. He knows what they will or will not do under certain conditions. He keeps up to the minute on all foundry techniques.

And, because Republic is the only producer of all grades of merchant pig iron, he is able to recommend the proper grade of pig iron for a specific job without hesitation or prejudice.

Next time you need technical or practical foundry advice, call in the Republic Pig Iron Metallurgist. There's no cost or obligation for his services. The coupon below will get things started.

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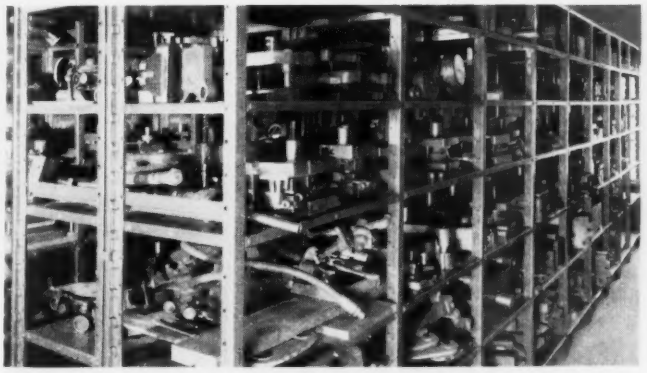
World's Widest Range of Standard Steels and Steel Products



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consisting of cabinets, rooms, barrels.

COMPLETE EXHAUST SYSTEMS
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varied according to the peculiar whim of the nightman or to some other nebulous factor. He then tempered the steaming mass with water squirted from an open hose. Placing his thumb over the 1½-in. opening, he fanned the stream into what he called a spray. To my mind, it still had hydraulic force, for it washed a good proportion of the clay away from the sand grains and sent it to the bottom of the pile. After thoroughly soaking this shakeout material with water, he let it steam for awhile, then returned and added more water.

It was the same old story: Next day our sand ran from 7 to 10 per cent moisture, and the molder had to resort to every trick he knew in the hope of producing salable castings. Too often the tricks didn't work, and the daily scrap pile provided mute evidence of the cost of sand failure. We knew what we needed, but we thought we just couldn't afford to spend that kind of money actually, we couldn't afford not to!

We couldn't afford to fix the leaks in the roof, so we paid the exorbitant price of having water where we didn't want it. We probably never will know just how "penny-wise" and pound-foolish" we were.

Mismanagement finally ended its pitiful course. A new group of directors (or at least a wiser one) envisioned a plant where kilowatt-hours might be more effective than many of the man-hours which were proving wasteful and even destructive. A sand-conditioning system was installed, scoop trucks purchased, modern molding and coremaking machines displaced the antiques, and a comparatively modest investment gave us a new lease on our industrial life.

At first, we were somewhat frightened by the financial obligation assumed. The cost seemed high, but we were soon to learn that we were spending pennies and getting dollars in return. All green sand was mulled, with moisture, strength, and other properties controlled within limits previously not even thought within the realms of possibility.

Sand control no longer was a nightmare, but something attainable. Casting finish and soundness were greatly improved, the daily scrap pile substantially reduced and production noticeably increased. If the customers were not happier, they certainly did less complaining. But more than this, all concerned have a new outlook—a healthy and exciting interest in a more dignified method of making castings. We are convinced that it was well worth the cost!

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NEW, vastly improved MACKLIN B-5 Bond for all snagging operations is gaining new users all over the country. Try it on your next job.

As a result of extensive research, the MACKLIN new, improved B-5 resin bond is setting higher standards of performance. Faster cutting, with maximum wheel life, it is now giving MACKLIN B-5 users lower grinding costs.

We suggest you investigate the benefits of using the new B-5 MACKLIN wheels to lower your snagging costs.

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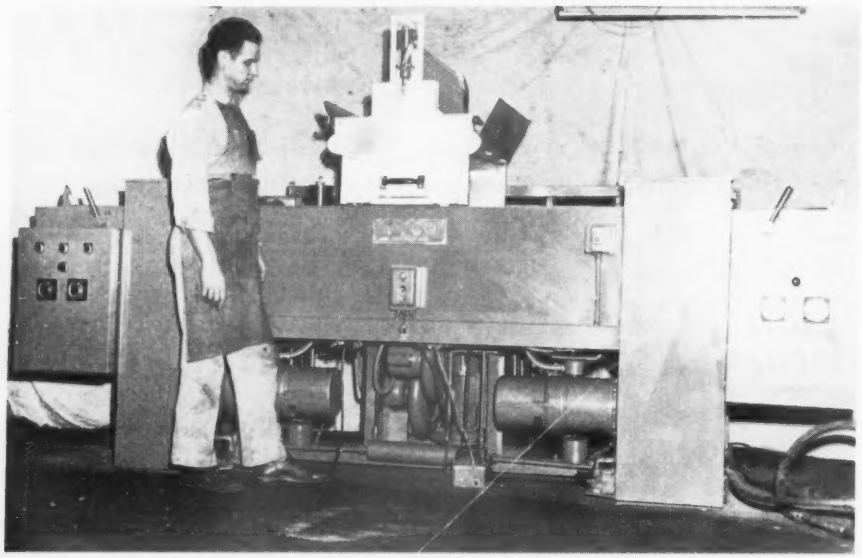


Shell Mold Machine: Tyler Metal Products Co., 1101 Tyler St., St. Louis, Mo.—Automatic double-ended shell molding machine is manufactured in three stock sizes, 14 x 28, 13 x 24 and 20 x 30 in., but can be made in any size to meet individual requirements. Double-ended machines can be operated either as a single or double unit. Double unit setup allows operator to make an investment on one end while the oven is curing shell on other end, thus making two shells; or one complete mold in 1½ minutes using a 15-second investment cycle. Cycling is automatic. By pressing one button the machine will go through its complete investment and curing cycle.

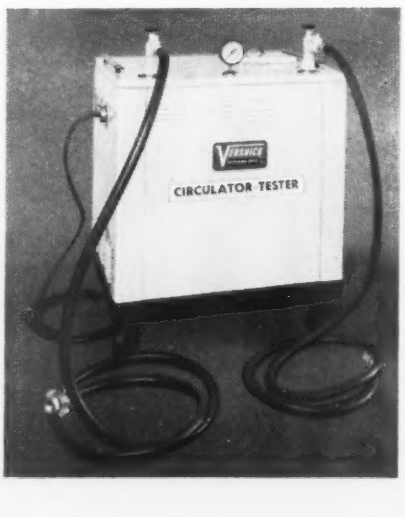
Patternplates are heated by individual gas burners which travel with the pattern. Curing oven is manually operated from one end of the machine to the other and also is gas heated. Oven doors operate automatically with each cycle. Mold ejection from pattern is by air. Any type gas can be used. Minimum of 4 in. water column pressure is required for gas line. Gear head motors and blower motor take 220/440 v, three phase. For air ejection 80 to 100 psi line pressure is needed.

For More Details Circle No. 1—Page 315

Furnace Linings: Electro Refractories & Abrasives Corp., Buffalo, N. Y.—Silicon carbide sectional ring linings are said to accommodate most large crucible furnaces. Interior diameters of 34, 37 and 41 in. are available. Each ring for the 34 and 37 in. linings is comprised of three sections with tongue and groove ends. The 41-in. unit is made in four pieces. Rings contain at least 5 per cent silicon carbide.

For More Details Circle No. 2—Page 315

Casting Sealer: Versnick Mfg. Co., 4700 East Nevada, Detroit 34, Mich.—A circulator forces liquid sealing compound by hydrostatic pressure into the pores of porous castings such as brass, aluminum, cast iron, magnesium and other metals. Sealing solution is electrically heated and thermostatically controlled to maintain a constant temperature. Manufacturer claims that use of the circulator makes it possible to salvage castings that otherwise would be scrap.

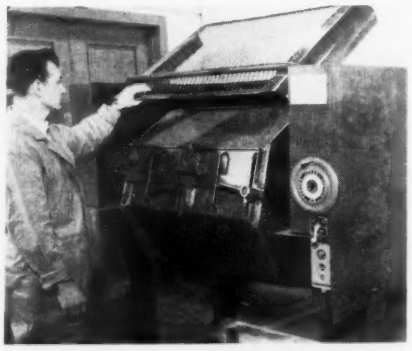


For More Details Circle No. 3—Page 315

Conveyor Lubrication: U. S. Engineering Co., 14561 Lesure Ave., Detroit 27, Mich.—Answer to the problem of conveyor lubrication maintenance is said to be provided by a new heat-treated rivetless conveyor chain. The chain conforms to similar chains except that it is manufactured with a lubricant-impregnated pin and the bearing surfaces of the links are machined. Friction is said to be reduced 75 per cent compared to dry steel running against dry steel. The chain, which has an ultimate strength upwards of 53,000 lb, has operated in temperatures of −30° to 2000° F.

For More Details Circle No. 4—Page 315

Barrel Finisher: Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6, Minn.—All moving parts of barrel finishing machine are enclosed. Motor, speed reducer, speed changer and brake are mounted in a single unit at rear to make all lubrication points accessible. Cylinder can be removed without disassembling the machine. Three power ranges of 1½, 2 and 3 hp are available to meet different requirements.



For More Details Circle No. 5—Page 315

CO_2 Hardening: Carver Foundry Co., 1056 Hershey Ave., Muscatine, Iowa—Materials and equipment, including the coremaking machine shown here, are being offered for the hardening of cores and molds by the carbon dioxide process. The sand binder, known as Steinex, was developed by Schmidt-Philipp in Germany. It is a silicate solution plus a soluble organic addition which makes it suitable as a binder for foundry purposes.

The binder is added to the sand by mechanical mixing. After the

For More Details on These Items
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core or mold is formed, vent holes are punched into it and CO_2 is blown into the holes under pressure. The sand mixture hardens in a matter of seconds by chemical reaction, and the core or mold can be used immediately. The coremaking machine, available in five sizes, is known as the Hansberg Coreshooter. In operation, only a limited amount of

compressed air expands on the sand in the cylinder. Once the corebox is filled, the air circulates back through sand left in the cylinder to keep it flowable.

Demonstrations of this CO_2 process will be held daily during the AFS convention in Houston at Dee Brass Foundry Inc.

For More Details Circle No. 6—Page 315

Plastic Compound: Industrial Development & Mfg. Corp., Needham, Mass.—Viscous, metal-filled plastic material reportedly can be molded like putty to conform to almost any model or pattern and then hardened to produce a precision replica of the original. In application, the plastic is spread over the pattern or poured into a form containing the pattern and allowed to harden. No pressure is required and no volatiles are given off. When hardened the material can be drilled, tapped, threaded, milled, broached or sawed with ordinary metalworking tools and equipment. Two types can be provided, one to be applied with a putty knife or spatula to vertical surfaces, the other, to pour into a form.

For More Details Circle No. 7—Page 315

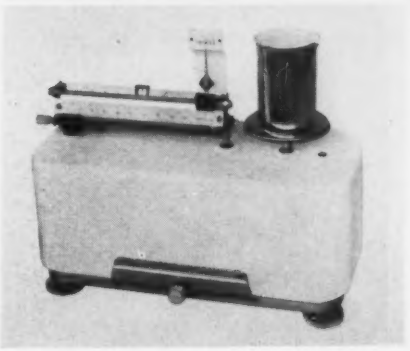
Compressors: Pennsylvania Pump & Compressor Co., Easton, Pa.—Line of air or gas compressors are of the horizontal, single-stage, double-acting, water-cooled type constructed with sectionalized cylinders arranged in three pieces for ready disassembly and removal of liner without disconnecting inlet or discharge air piping. Models are available in 25 to 100 hp ratings. Cylinder diameters range from 8 to 14 in., with 9 to 13-in. strokes, respectively.

For More Details Circle No. 8—Page 315

High-Purity Graphite: Stackpole Carbon Co., St. Marys, Pa.—New process is claimed to permit purification of graphite in diameters up to 2¾ in., and up to 43 in. in length. Four grades have a total ash content of 0.003 per cent or less. Manufacturer says that several of the grades have been used successfully as crucibles and boats in the final purification of germanium. As heating elements in electric furnaces, they have a reported lengthy life at elevated temperatures.

For More Details Circle No. 9—Page 315

Moisture Balance: Torsion Balance Co., Clifton, N. J.—Balance for moisture determination has a single

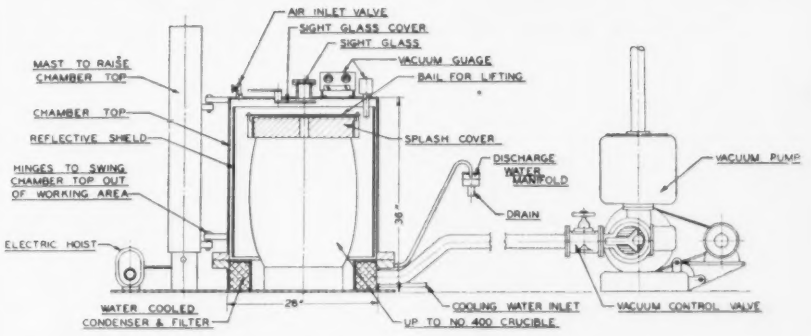


calibrated stainless steel beam and a vernier slide weight, with coarse and fine adjustments. It allows determination of moisture in a 10-gm sample, from 0.1 to 100 per cent. Another slide weight provides for the taring of containers weighing up to 45 gm. A second slide weight may be positioned to tare, 2, 5 or 10 gm samples.

For More Details Circle No. 10—Page 315

Pallet Truck: Moto-Truc Co., 1978 East 59th St., Cleveland 3, O.—Pallet truck features a newly incorporated "jack knife" action to allow the truck frame sufficient clear-

Degasser Permits Use of Existing Furnaces



VACUUM degassing unit permits metal to be melted in conventional, existing furnaces and eliminates the necessity of utilizing vacuum furnaces to obtain the improved physical properties and higher quality metal obtainable from gas-free metal. After degassing, metal can be poured into sand molds, permanent molds or ingots, as desired. During short period metal is subject to air it still remains of high quality. System is suited for aluminum and magnesium as well as pure copper and copper-base alloys.

Company's unit is 28 in. wide and 36 in. high and uses up to a No. 400 crucible to hold the metal being degassed. Condenser and filter are water cooled. Sight glass on top allows operator visually to check condition of the melt. Mast on side of unit is an integral part of system and permits raising chamber top by electric hoist. Hinges on side of mast are to swing chamber top out of working area. Equipment is manufactured by Centrifugal Casting Machine Co., P. O. Box 947, Tulsa 1, Okla.

For More Details Circle No. 11—Page 315

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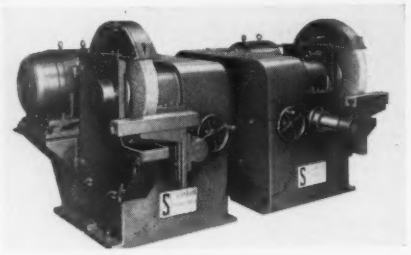
ance for uneven floors or sharply rising ramps. Clearance angle eliminates "hang up" and increases operational range of walkie type trucks. Action, which is accomplished by a hydraulic pump and ram unit, is optional on the company's complete line of walkie trucks. Truck has standard controls and dead-man brake. Power by either a 12 or 18-v battery.

For More Details Circle No. 12—Page 315

Snagging Grinder: Standard Electrical Tool Co., 2507 River Rd., Cincinnati 4, O. — Variable speed



snagging grinders are available in sizes from 5-hp 20-in. to 100-hp 30-in. wheels. Either right or left hand single wheel machines provide 9500 sfpm throughout wheel life by turning hand wheel located at front of machine. This wheel also positions guard for maximum safety. Specially designed guard latches are said to eliminate use of tools in maintaining efficient cutting speed and reducing down time in changing wheels.

For More Details Circle No. 13—Page 315

Universal Machine: Newage International Inc., 235 East 42nd St., New York 17, N. Y.—Metalworking

machine is adaptable to a wide range of accessories to produce the movements necessary and the full range of speeds required to perform over 50 operations. Accessories to perform the many operations are provided as complete units and when accessories are fitted to the basic unit the setup becomes a single-pur-

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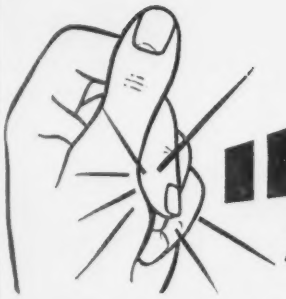

IDEAS FOR FOUNDRYMEN

HERE ARE QUICK REVIEWS OF NEW LITERATURE—available to foundrymen as "idea" and reference information. Readers in the United States and Canada may obtain copies by using the attached cards. Readers in foreign countries should write direct to the manufacturer offering literature.

81. Mechanized Furnaces

Surface Combustion Corp., Toledo 1, O.—Advantages of mechanized standard rated heat treat furnaces when combined with accessory work conveying mechanisms or built-in conveying mechanisms are covered in bulletin SC-169. Schematic diagrams of both types of accessories are shown to illustrate how such arrangements can provide for the degree of mechanization required—from fully automatic operation to hand charging and discharging of tray or basket loads on furnace hearth roller rails.

82. Floor Trucks

Hamilton Caster & Mfg. Co., 1700 Dixie Highway, Hamilton, O.—Illustrated catalog 100 describes line of platform trucks, two-wheel hand trucks, shelf and tray trucks, box trucks, wagon trucks, skids, and dollies for industrial and commercial use. Full technical data and specifications together with a special section illustrating available accessories, body styles and superstructures is included.

83. Shell Mold System

Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.—Automatic shell molding and shell closing machine combine to make a compact system capable of high volume production of 240 shells per hour. Engineering data, specifications and schematic diagrams of machine's operation are contained in book 2462.

84. Rollover Machines

Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.—Bulletin 534 describes line of rollover machines which produce small molds and cores up to those which mold, roll over and draw patterns from flasks weighing 3000 lb. Machines can be built to specifications for handling up to 7000 lb capacity. Smaller machines are hand operated while larger units are power controlled. Machines are illustrated and engineering data is included.

85. Penetrant Inspection

Magnaflux Corp., 7321 West Ainslie Ave., Chicago 31, Ill.—Applications for portable dye penetrant inspection kit that uses completely self-contained pressure cans as the dispensing agent are presented in illustrated folder. Inspection materials—penetrant, cleaner, developer—are packaged in pressure cans for portability and ease of use.

86. Resin Curing Agent

Shell Chemical Corp., 50 West 50th St., New York, N. Y.—Data sheet covers newly developed amine curing agent said to be useful in epoxy castings, potting and adhesives and laminating applications where room temperature or moderately elevated temperatures of curing are desired.

87. Refractories

Richard C. Remmey Son Co., Hedley St. & Delaware River, Philadelphia 37, Pa.—Information on process methods, composition and properties, chemical analyses, thermal conductivity and uses of crystallite refractories is contained in bulletin CR-11.

88. Lift Truck

Barrett-Cravens Co., 628 Dundee Rd., Northbrook, Ill.—Complete specifications, operational features, and performance charts on an electric platform low lift truck are presented in bulletin 551-1.

89. D-C Motors

Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland 10, O.—Illustrated bulletin C-2002 includes information on speed ranges,

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acceleration rates, enclosures, dimensions and selection data on line of direct current motors. Photographs, diagrams, charts, and sketches help illustrate the story of the motor's fast action to demand for change by having built-in increased commutation capacity, low time constants in electromagnetic circuits and lowest possible inertia.

90. Fork Trucks

Lewis-Shepard Products Inc., Dept. R-8, Watertown, Mass. — "Facts About Fork Trucks—The Gas vs. Electric Question," is title of folder that presents a study of capabilities of gasoline and electric-powered fork trucks operating under normal conditions. Folder contains 12 fact sheets plus two maintenance report forms to enable user to keep a breakdown of labor, parts and power costs for both types of trucks.

91. Hydraulic Cranes

Austin-Western Co., Division of Baldwin-Lima-Hamilton Corp., Aurora, Ill.—Principal dimensions, performance and engineering data, working ranges, load charts and available attachments and special equipment for 2 and 4-wheel drive, low and high frame hydraulic cranes are described in bulletin AD-2253.

92. Woodworking Machinery

Oliver Machinery Co., Grand Rapids 2, Mich.—Folder illustrates and details features of company's disk and spindle sanders, circular and band saws, pattern lathes, surfacers, jointers, type embossing presses, benches, vises, wood trimmers, tool grinders, routers-borers and pattern milling machines.

93. Dust Collector

National Engineering Co., 549 West Washington Blvd., Chicago 6, Ill.—Cutaway closeups, installation and operating data on wet-type, triple-action dust collector are contained in bulletin 514. Detailed description of the unit's impingement-entrapment-particle separation cycle is presented also.

94. Water Clarification

Monsanto Chemical Co., Plastics Division, Springfield, Mass.—Bulletin 1008 details the chemical properties and uses of a flocculating agent which is said to provide a solution for the clarification and recovery of wash waters from foundry sand reclamation systems.

95. Vacuum Pumps

Kinney Mfg. Division, New York Air Brake Co., Boston 30, Mass.—Catalog 400 details capacities, dimensions, weights, cutaway views and performance curves of two-stage construction, mechanical booster high vacuum pumps. Two-stage units consist of a rotary positive displacement booster pump exhausting into the inlet of a single-stage duplex model cam and piston type high vacuum pump. Line of bronze, cast iron and fabricated steel vacuum-tight valves also are described.

96. Core and Mold Coatings

Thiem Products Inc., 9800 West Rogers St., Milwaukee 14, Wis.—Product descriptions of several high refractory core and mold coatings and core oils for gray iron, steel and nonferrous foundry use are given in folder. Other products described briefly are a liquid parting, cupola flux, core paste, mudding compound, ingot mold coating and an inert refractory formulation to eliminate chill fusion to casting surfaces.

97. End Assemblies

Sandvik Steel Belt Conveyors, Division of Sandvik Steel Inc., 111 Eighth Ave., New York 11, N. Y.—Bulletin 201 covers "packaged" terminal end assemblies for steel belt conveyors and discusses both tension end and drive end component assemblies as pre-engineered units ready to operate as soon as mounted to supporting framework.

98. Automation Dictionary

Minneapolis-Honeywell Regulator Co., Industrial Division, Philadelphia, Pa.—Pocket-size "Automation Dictionary" covers with clear laymen-like definitions some 87 words and phrases relative to automation that are becoming an accepted part of the expanding vocabulary of automation.

99. Plastic Refractories

North American Refractories Co., Cleveland 14, O.—Plastic and castable refractories are described in bulletin 105. Instructions for use are given, and a table lists principal uses, general characteristics, temperature of use and size of containers of each of the products.

100. Dust Arrestors

Parsons Engineering Corp., 4590 Beidler Rd., Willoughby, O.—Bulletin DA-7 describes advantages and operational features of oval bag dust arrestors that can be supplied in a variety of sizes and capacities to meet specific requirements and conditions.

101. Clay

Cedar Heights Clay Co., 50 Portsmouth Rd., Oak Hill, O.—Four-page folder describes location of deposits and manufacturing processes used in producing a bonding clay of 8, 12, 16, 20 and 30 mesh, a fire clay of 8, 12, 16 and 20 mesh and a fine air floated clay of 200 mesh quality.

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pose machine tool. Drive from the motor gives a range of 24 spindle speeds from 65 to 2800 rpm. Locating pads are machined at front of the head for accurate location of various attachments. Rise and fall compound table is made with micrometer dials and a rack and pinion.

For More Details Circle No. 14—Page 315

Tote Box Truck: Techtmann Industries, 407 East Michigan St., Milwaukee, Wis.—Tote box truck is for handling heavy materials in single or stacked boxes. Truck has a pivoted carrier platform which tilts to the floor to an inclined position for loading. A hook engages the drop handle or hand hole of the box. When leverage truck handle is pulled forward, the load slides up the incline platform. Carrier platform automatically lowers to a horizontal position. Three 3½-in.-diam, 1¼-in.-face, antifriction bearing wheels carry the load. Platform has a width of 13-in., length of 27 in., and a height of 5 in. Capacity is 800 lb.

For More Details Circle No. 15—Page 315

Stack Cap: Hartzell Propeller Fan Co., Piqua, O.—Stack cap for use in industrial exhaust systems with a fan or a blower located at the most convenient spot in the system is made of a band of 20-gage galvanized steel mounted on an angle iron ring which bolts to a similar ring on the end of the vent. Two galvanized lids within the windband are mounted on a brass rod which turns in plastic bearings. The lids open automatically when the system is operating and close tightly when the fan goes off. The stack cap is available in sizes from 12 to 48 in. in diam.

For More Details Circle No. 16—Page 315

Polyphase Motors: General Electric Co., Schenectady 5, N. Y.—New transition polyphase motor line in the 1 to 5 hp range is being built in the old frame sizes and dimensions of the National Electrical Manufac-

Make high-strength aluminum castings without heat treatment!

Foundries without heat treating facilities are producing high-strength aluminum castings with Federated's Tenzaloy. Mechanical properties are equivalent or superior to the common heat-treated alloys, and impact strength is greater.

Tenzaloy, a product of Federated research, is a self-aging alloy of the aluminum-zinc-magnesium type. It reaches full strength after a few days aging at room temperature. No special casting precautions or facilities are required.

Tenzaloy castings have excellent machinability. They can be anodized to a superior white color. Tenzaloy is one of the few casting alloys that can be brazed at high temperature. It has corrosion resistance equal to or better than the aluminum-silicon alloys.

If your heat treating facilities are inadequate or too costly, or if you are paying for outside work, or if you are casting large and complex aluminum shapes which cannot be conveniently heat treated, call Federated for more information on modern Tenzaloy. Any of our 13 plants and 23 sales offices across the country is ready to help.

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turers Association but incorporate the features of polyester film insulation, silicone water repellent core, solid cast rotors, advanced design for sonant operation and modern appearance.

For More Details Circle No. 17—Page 315

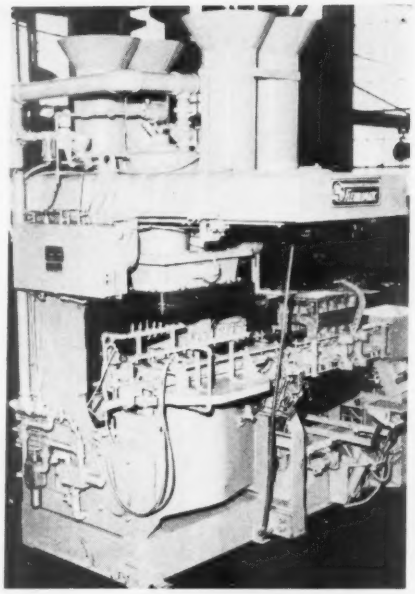
Fire Brick: Robinson Clay Products Co., Refractories Division, 65 West State St., Akron 9, O.—Line of refractory fire brick is available for three heat-duty classes—superduty, high-heat-duty and low-heat-duty. Brick are made from selected and tested clay and are manufactured by the de-aired, extruded and repressed process.

For More Details Circle No. 18—Page 315

Safety Glasses: Willson Products Inc., Reading, Pa.—Lightweight glasses are said to provide ample protection for light grinding, spot welding, inspection or other jobs which do not require use of heavy-duty goggles. Clear or green acetate lenses can be provided. Glasses will fit over prescription glasses.

For More Details Circle No. 19—Page 315

Coreblower: Beardsley & Piper Division, Pettibone Mulliken Corp., 2424 North Cicero Ave., Chicago 39,



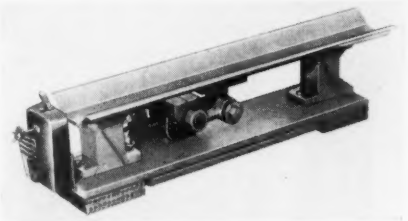
Ill.—All-pneumatic and all-automatic coreblower blows, rolls over and draws 240 cores per hour. Operator needs only to actuate one valve, place a core plate and remove a finished core on each cycle as indexing of the box, blowing, rollover and drawing, ejection and delivery of the box are automatic. One man can operate more than one unit at a time, according to the manufacturer, since operation of each unit requires only 20 per cent of his time. Units are available that will handle cores up to 60 lb.

For More Details Circle No. 20—Page 315

Sealing Compound: Permagile Corp. of America, 32-14 Northern Blvd., Long Island City, N. Y.—Sealing and waterproofing compound is paste-like and when subjected to the action of a setting agent reportedly turns into a hard mineral-like substance of extraordinary strength. Cracks or voids in cement, concrete, cinder blocks or masonry can be filled and sealed with the compound. Material can be applied by trowel, screed or spatula, and may be painted subsequently.

For More Details Circle No. 21—Page 315

Vibrating Conveyor: Carrier Conveyor Corp., 2144 Frankfort Ave., Louisville, Ky.—Vibrating feed-



er-conveyor uses solid, 3-in. blocks of neoprene rubber instead of coil or leaf springs. A metal strip permanently imbedded in each neoprene mount at 60 degrees from horizontal forces all movement in the amounts to take place at a 90 degree angle from the linear direction of the metal strip, with a resulting 30 degree conveying angle of throw. Overall height of unit is 8½ in. For special applications heights as low as 4 in. can be supplied. Rate of feeding or conveying can be varied from 1 to 60 fpm. When used as a conveyor, units can be equipped with dust covers, dividers, discharge sections, screen decks or other processing features.

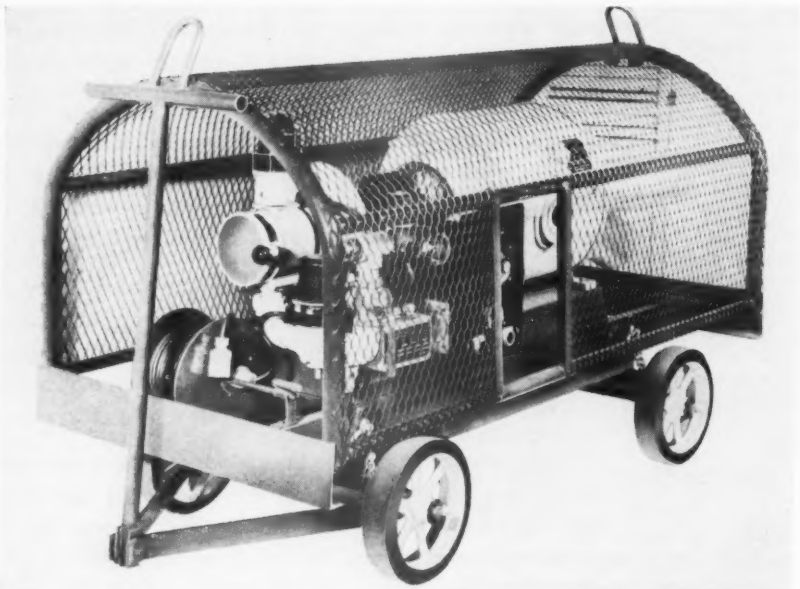
For More Details Circle No. 22—Page 315

Direct Reader: Baird Associates Inc., 33 University Rd., Cambridge 38, Mass.—Small, direct-reading instrument that will accommodate six elements in one matrix is for quality control use directly on the foundry floor. Features include a sealed optical system, dust tight electronics and an automatic mechanism for maintaining optical alignment.

For More Details Circle No. 23—Page 315

Die Casting Machine: Kux Machine Co., 6729 North Ridge St., Chicago 26, Ill.—Gooseneck die casting machine for zinc, lead or tin cast-

Portable Mold Drier Takes Heat to the Mold



LIGHTWEIGHT, portable mold drier requires 3 x 6 ft of floor space and brings the heat to the mold rather than taking the mold to the heat. Machine is completely automatic, requires no attendant and reportedly can be placed in operation on a mold in less than five minutes. Drier burns any commercial gas, requires no vents, smoke stacks or special outlets. Any drying temperature, and any time program can be achieved, automatically, by turning a knob. Any drying depth can be obtained in the same manner. Unit is manufactured by the Heat Transfer Division, Milwaukee Shipbuilding Corp., Milwaukee, Wis.

For More Details Circle No. 24—Page 315

Now! a Compact TRACTO LOADER for Close-Quarter Work

Ideal For Handling Bulk Material in Confined Areas . . . For Unloading Box Cars, Traveling Through Narrow Aisles and Doorways, Making Hairpin Turns Near Columns and Posts

TRACTOMOTIVE TL-6 TRACTO LOADER

BUCKET CAPACITY: ½ cu yd
BRAKE HP: 33.7
SPEEDS: 2 forward; up to 10 mph
2 reverse; up to 20 mph
WEIGHT: 6,000 lb

Has Short 6½-ft Turning Radius . . . Over-all Length only 9 ft, 7 in., Width 4 ft, 5 in. . . . Plus Other Outstanding Performance and Service Features

Tip-Back Bucket Gets and Carries Bigger Loads 22° tip-back of bucket at ground level gives you "scooping action" for fast, full loading. You also save time getting away with load, hold spillage to a minimum, because bucket tips back quickly to a 50° carry angle at only 3 ft above ground. Low carrying position plus greater tip-back moves load center closer to tractor for better over-all balance.

Torque Converter Drive Works Smoother, Easier . . . crowds steadily into the pile, eliminates most shifting, engine stalling and wheel spinning . . . greatly reduces tire wear. Tractor's weight plus large drive wheels enables the TL-6 to take advantage of the high, three-to-one torque ratio.

Clutch-Type Transmission Speeds Work Cycle You simply push a single lever to go forward; pull it back for reverse. Reverse is twice as fast as forward to assure the fastest possible work cycles.

Built for Long, Hard Service — filters in hydraulic system and transmission . . . replaceable hardened pins and bushings. All maintenance points easily accessible. Lift and dump cylinders are located well above floor for extra protection from dust.

• • •

Ask your Allis-Chalmers Industrial Tractor Dealer to show you the TL-6 in action. See how Tracto-Loader design can speed your operation.

Sold and Serviced by your Allis-Chalmers Industrial Tractor Dealer

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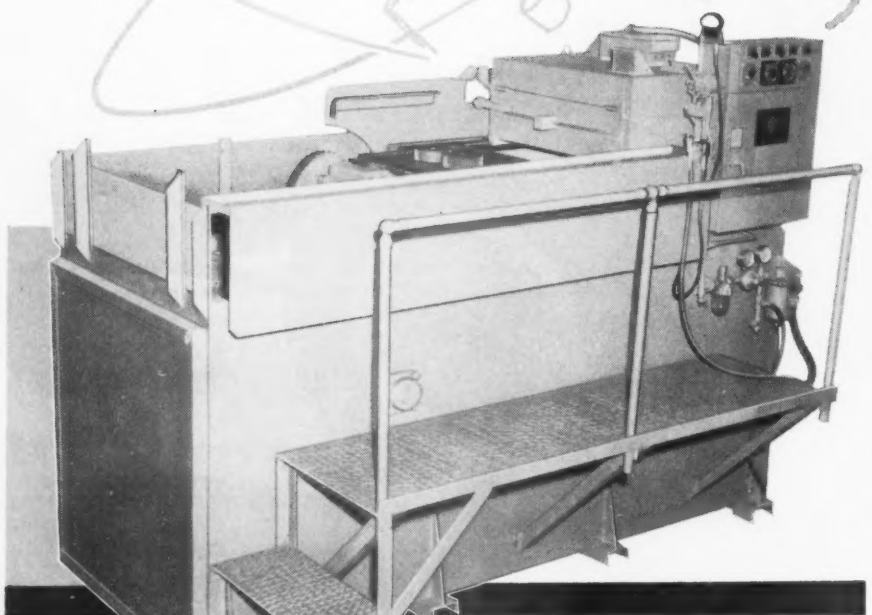
Tracto-Loaders • Tracto-Shovels • Side Booms and Hydraulic Rippers for Allis-Chalmers Crawler Tractors • Loader and Shoulder Maintainer for Allis-Chalmers "D" Motor Grader.

Precision Shell Molds

In less than 70 Seconds

at the push of a button!



Note these Features!

- Infra-red radiant heat curing oven
- Automatic shell ejection system
- Permanent built-in infra-red pattern heating
- Interlocked for safe operation
- Adjustable pneumatic controls
- Cushioned air cylinders
- Machine can be pitted below floor level or used with platform
- 20" x 26" pattern area x 8" depth
- Automatic louvers for vertical drop of sand
- 700 lb. sand capacity

Increase your foundry production, reduce labor costs, sand handling, metal wastage and machining operations, and put precision shell molding on a *push button* production basis —with the *new* . . .

SHELL-O-MATIC
Automatic Shell Molding Machine

A complete cycle from heating of pattern to inspection of finished precision shell takes *less than 70 seconds* with this fully automatic machine. Unskilled personnel can easily handle its most simple operation and yet produce 50 or more completely cured shells per hour! Pattern changeover is a matter of minutes. Quickly installed—one electrical and one air connection and machine is ready for operation.

Write, wire or phone for complete details showing how SHELL-O-MATIC can reduce costs and increase production in *your* foundry.

SHELL-O-MATIC, INC.
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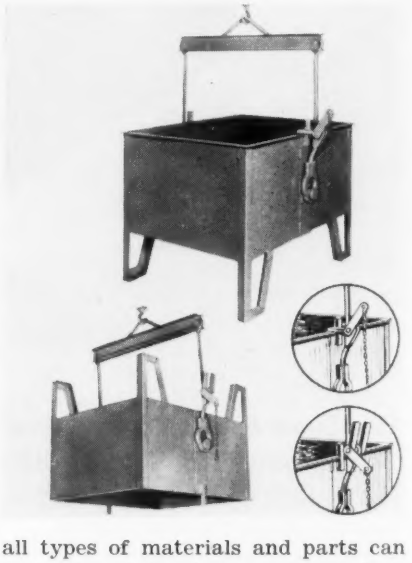
146 Coit St., Irvington, N. J. — Manufacturing

3765

ings weighs 24,000 lb and has a 400-ton rated die clamping pressure capacity. Die space between tie bars is 17¾ x 32½ in. Die plates measure 35¼ x 44½ in. A 12-in. die separation stroke permits deep draws. Hydraulic system uses two single-stage pumps mounted to a 15-hp double-end motor capable of an operating speed of a full 10 cycles per minute. Capable of injecting up to 25 lb of zinc, the machine applies injection pressures up to 2000 psi with injection speeds up to 400 fpm. Unit is fully automatic with all phases controlled electrically. Model can be adapted as a convertible machine having a cold chamber injection unit for producing aluminum, brass and magnesium castings.

For More Details Circle No. 25—Page 315

Dump Box: Palmer-Shile Co., 16033 Fullerton, Detroit 27, Mich.—Automatic dump box for handling



all types of materials and parts can be used with hand, power lift or fork truck or can be picked up and moved by overhead hoist. Gravity latch locks box in upright position until ready for dumping. Of heavy gage steel, all-welded construction, the boxes are 24 in. deep by 36 in. wide by 48 in. long, or built to specifications.

For More Details Circle No. 26—Page 315

Solder: Anchor Metal Co., 244 Boerum St., Brooklyn 6, N. Y.—New type solder is composed of a mixture of fine powdered solder and an active flux. The product is a creamy paste packaged in a plastic squeeze bottle. The solder is squeezed on the surface to be bonded and is said to tin and sweat in one operation.

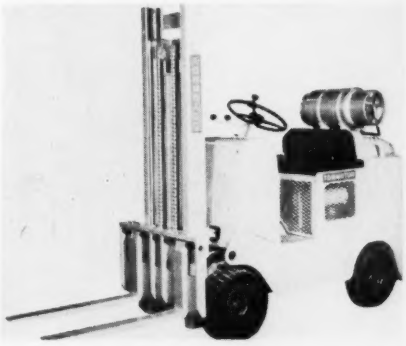
For More Details Circle No. 27—Page 315

Stainless Steels: Waimet Engineering Co., 1999 Guoin St., Detroit 7, Mich.—Single analysis stainless steels are said to meet the specifi-

cations of various testing and engineering societies. Alloys are refined, prealloyed metals specifically designed for remelting to produce precision castings. Slugs, ingots and shot are available.

For More Details Circle No. 28—Page 315

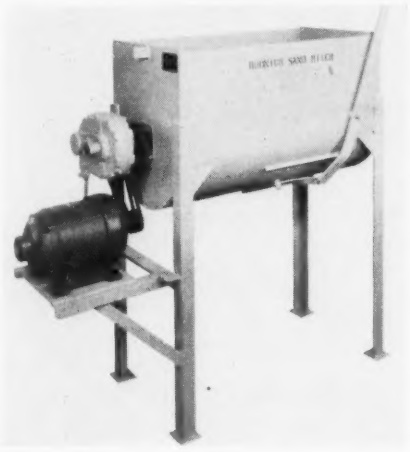
LP Fork Lift Trucks: Towmotor Corp., 1226 East 152nd St., Cleveland 10, O.—All of company's fork lift trucks now are available in gaso-



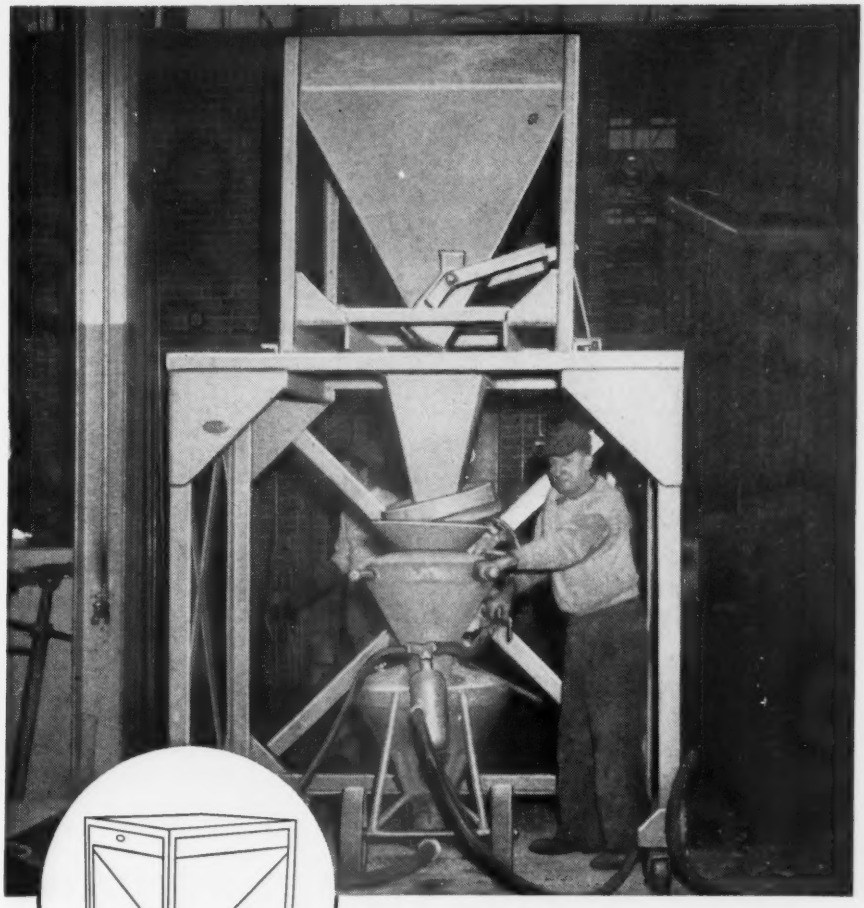
line and liquefied petroleum gas models. Manufacturer reports advantages of lower fuel cost, longer engine life, complete fuel combustion, no engine knock, longer spark plug life, more mileage from oil, minimum carbon monoxide, and safer operation. Information on equipment needed to convert gasoline systems to use of LP gas is offered by the company.

For More Details Circle No. 29—Page 315

Core Sand Mixer: Budnick Mfg. Co., 1109 Michigan St., Grand Rapids, Mich.—Core sand mixer features five detachable, double-type paddles of heavy-duty all-welded steel to pro-



vide thorough end-to-end mixing. Sliding gate discharge in bottom of 4-cu-ft tub regulates any amount of sand required. Clearance under tub is 27 in. high by 37½ in. wide for placement of wheelbarrow or box to receive blended sand. Spur gear reducer is shaft mounted with center line action. Tub is 36 in. long, 18 in. in diam and has a 330-lb ca-



Specially designed hopper bucket makes cupola lining more efficient. Bucket is placed on frame by use of a lift truck.

Solve Your Material Handling Problems With PENN IRON SPECIAL EQUIPMENT

In lining cupolas, Textile Machine Works foundry in Reading, Pennsylvania, had difficulty handling the clay mix used with their Bondactor equipment. After a study of the problem, Penn Iron Works, Inc., designed, engineered and manufactured this special hopper bucket for maximum handling efficiency.

Whatever the bulk-material handling problem in your plant, Penn Iron Works, Inc., will be glad to help with its solution. Our wide experience in designing and manufacturing all types of buckets and special handling equipment for foundries can help you cut costs . . . save time . . . increase efficiency.

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for as little as..... **$4.70**

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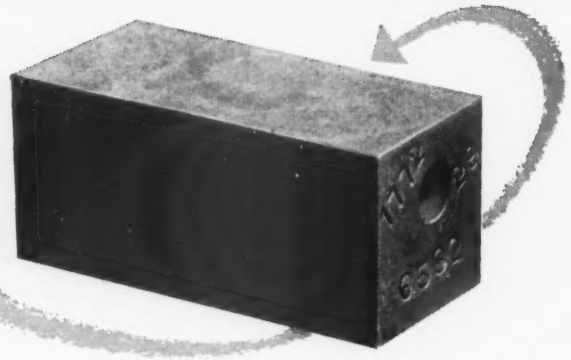

Durable CARBOFRAX® silicon carbide blocks give 20 or more hours uninterrupted service in continuous pour cupolas . . . with practically no change in hole size. But why take our word for it? Order a few and see for yourself. Single standard size block costs only $4.70. Other sizes can be made from stock molds. Address Dept. AA55, Refractories Division, The Carborundum Company, Perth Amboy, New Jersey.

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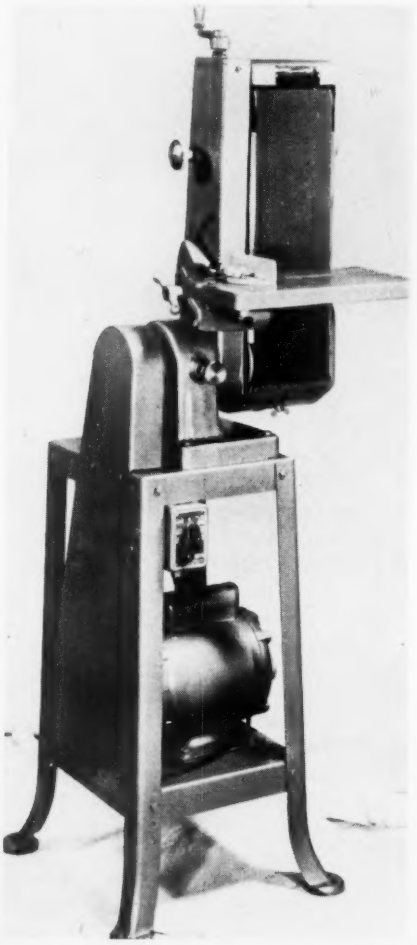
Plant: Clayton, Iowa

pacity. Motor is 2 hp, 1750 rpm, 220/440 v, 60 c, 3 phase. Also available are 2½ and 6-cu-ft models.

For More Details Circle No. 30—Page 315

Belt Grinder: Engelberg Huller Co., 831 West Fayette St., Syracuse, N. Y.—Utility grinder with 6-in. belt is adjustable to either vertical or horizontal position or to any intervening angle. Work table is adjustable to 45 degrees from belt, 20 degrees toward belt, and is slotted for an adjustable angle gage calibrated for any angle up to 90 degrees. Drive units are optional and include 1-hp, 60-cycle motors in single phase at 110/220 v, or in triple phase at 220/440 v. Belt speeds of 2800 and 4000 sfpm are available with a 1725-rpm motor.



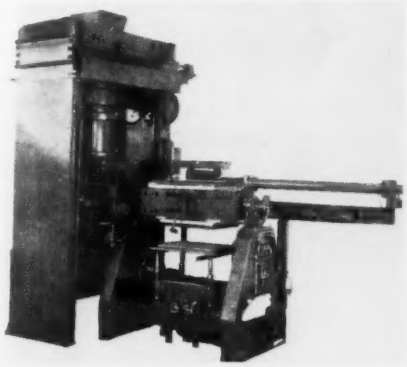
For More Details Circle No. 31—Page 315

Protective Paint: Garland Co., 3748 East 91st St., Cleveland 5, O.—Dual purpose protective paint for metal surfaces combines zinc chromate and aluminum pigments to give a two-coat job with just one application, according to the manufacturer. When brushed on a metal surface, the zinc reportedly drops to the bottom of the paint film to stop rust and corrosion while the aluminum metal leafs to the surface to form a finished aluminum coat. Manu-

facturer says the paint can be applied over a rusted surface with a minimum of preparation.

For More Details Circle No. 32—Page 315

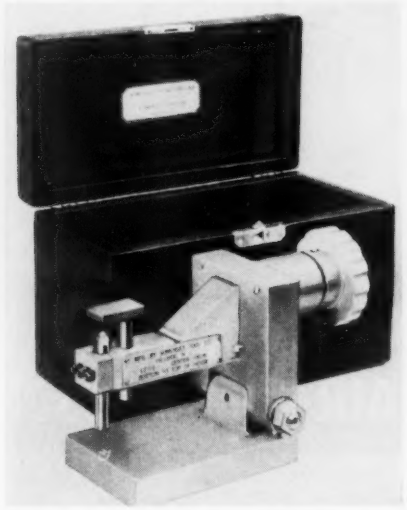
Coreblower: Wm. Demmler & Bros., Kewanee, Ill.—Fully automatic coreblower with stationary sand



magazine, double core roll-over draw machine and corebox shuttle will assertedly blow, draw and roll over and draw cores at a production rate up to 300 per hour with one man operation. Manufacturer reports that along with its high production potential the machine requires minimum maintenance because of rugged frame construction and heavy working parts.

For More Details Circle No. 33—Page 315

Wheel Dresser: Somerset Tool Co., 220 Virginia St., Hillside, N. J.—Wheel dresser for dressing grinding wheels of most diameters is said to maintain accuracy of 0.0002-in. Four stops allow complete control for dressing of concave or convex radii.



Manufacturer states that operation is so simple that a beginner can dress complex forms in a short time.

For More Details Circle No. 34—Page 315

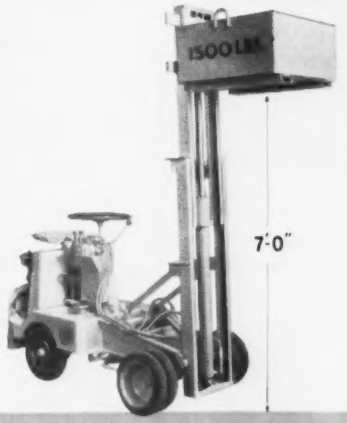
Limit Switch: Clark Controller Co., 1146 East 152nd St., Cleveland 10, O.—New heavy-duty machine limit switch has been designed for

You get 1-TON capacity with R-15 Moto-Bug®

Anywhere you are now using hand trucks or carts, you can get 3 to 4 times more production per man-hour with a low-cost Kwik-Mix Moto-Bug. For example —

Around mixers, moulding stations and ovens, in cleaning rooms and storage yards, R-15 Moto-Bug hauls up to 2,000 pounds of sand, scrap, slag, cores, flasks, and small castings in 15 cubic foot hopper* or on interchangeable 4½-foot flatbed platform. It carries 1-ton load up 16% ramps — has 550 pounds of drawbar pull for towing wagons or carts. There's 24-to-1 gear reduction ratio on steering wheel. Turning radius is only 73 inches. Overall width is 35 inches. Moto-Bug travels 6 m.p.h. forward and reverse, and has automotive brakes. Clutch lever and brake pedal are within easy reach of seated operator. This big, 4-wheel Moto-Bug is powered by standard-make, 8.3 h.p. gas engine (electric starting optional). There's a choice of pneumatic or solid-rubber soft-core tires. Dual drive tires also available, for extra traction, flotation and load-carrying stability on or off pavement. And that's not all —

*18 cu. ft. hopper optional



Interchangeable fork lift lets you use R-15 Moto-Bug for lifting, loading, stacking. It carries 1500 lbs. to 7-foot height. Mast can be tilted 10° back when carrying load, 2° forward for pick-up or releasing load. (For lighter work, Moto-Bug is also available in S-10 size with multiple attachments.) See Kwik-Mix distributor, or write for bulletin.

mail to: KWIK-MIX COMPANY, PORT WASHINGTON, WIS. *(Koehring Subsidiary)*

Send us literature on R-15 Moto-Bug with: ☐ hopper ☐ platform ☐ fork lift

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STREET.....

CITY..... STATE.....

☐ Also interested in 10 cu. ft., 1500-lb. S-10 Moto-Bug KM568 FO

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Since 1926
exclusive producers
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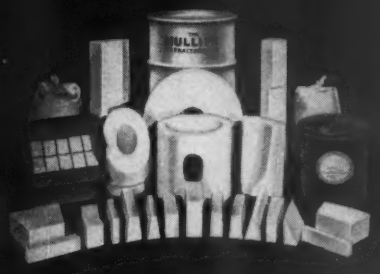
special shapes and
specialties



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SHAMVA Mullite brick, special shapes, ramming mixes and other specialties are engineered to *your* specific needs. Write for SHAMVA field engineering service.

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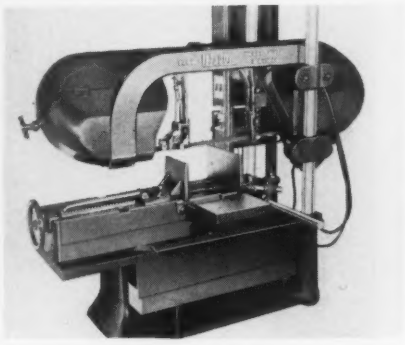
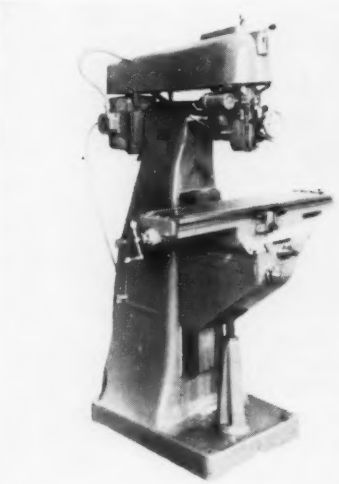
long life with minimum maintenance and greater ease in wiring. The switch is rated at 10 amp continuous capacity up to 600 v ac, 550 v dc. A heavy die-cast case with an integral solid wall separates the mechanical and electrical mechanisms.
For More Details Circle No. 35—Page 315

Band Saw: Wells Mfg. Corp., 310 Service Rd., Three Rivers, Mich.—Heavy-duty, hydraulically operated, metal cutting band saw features an



electrical system providing overload and low voltage protection and 110 v at controls. Saw has a capacity of 12¾ in. for round shapes, 12 x 16 and 11 x 18 in. for rectangular shapes. Driven by a 1-hp motor, the blade can be operated at selective speeds for 60, 115, 200 or 300 fpm. Base area is 28 x 48 in. Over-all size is 44 x 60 x 78 in. and height from floor to top of bed is 24¼ in.
For More Details Circle No. 36—Page 315

Vertical Miller: U. S. Burke Machine Tool Division, Brotherton Rd., Cincinnati 27, O.—Power feed head



vertical milling machine features an infinitely variable feed from 0.002 to 0.008-in. per revolution; 5½ in. of power quill travel; internally locked, completely enclosed hard chrome plated quill; 800 lb of down thrust; coarse and fine hand feeds as well as power feed; variable positioning of coarse feed lever and quill lock handle, and variability of feed

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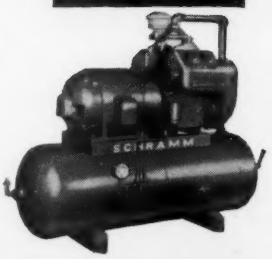
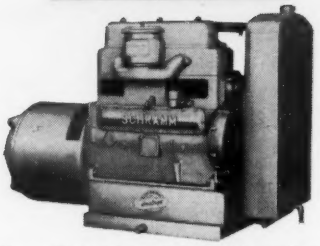


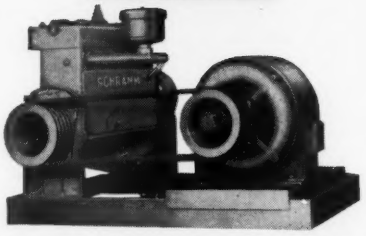
50* Direct Drive receiver mounted

EVERY



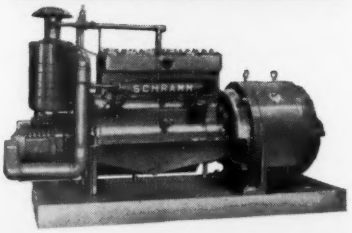
105* or 210* Direct Drive with cooling unit

PLANT



315* or 420* V Belt Drive with cooling unit

THERE'S A



600* Direct Drive for running water cooling

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Any size you need . . . from ½ hp to 150 hp. No foundation needed . . . No running water needed (Models for running water available where aftercooling is required to obtain dry air) . . . Direct Drive or V Belt . . . Central plant or unit system! Write for catalog 5510.

*Size is c.f.m. actual air delivery.

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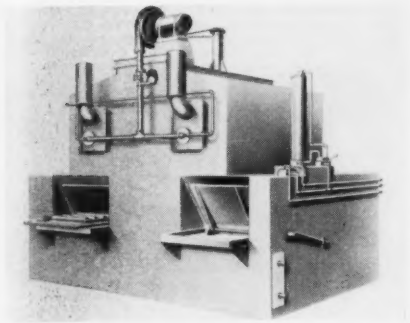
SCHRAMMAIR YOUR JOBS

rate while machine is in operation. Machine is available with or without power table feed.

For More Details Circle No. 37—Page 315

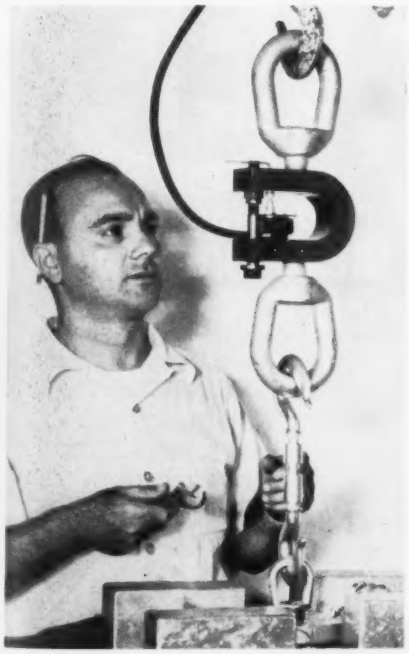
Batch Furnace: Holcroft & Co., 6545 Epworth Blvd., Detroit 10, Mich.—Bantam-sized batch furnace



for heat treat applications has capacity to heat 500 lb gross per hr to 1500° F. It can be operated at temperatures ranging from 400 to 1800° F. Two valves are involved in the operation. Typical cycles as carburizing, carbon-nitriding, clean, neutral bright hardening, normalizing, annealing, tempering and nonferrous heat treating can be run. Furnace requires less than 63 sq ft of floor space.

For More Details Circle No. 38—Page 315

Limit Switch: W. C. Dillon & Co., 14620 Keswick St., Van Nuys, Calif.—Limit switch of 20,000 lb capacity prevents overload damage to



hoisting equipment by automatically cutting out lifting power whenever the safety maximum is exceeded. Accuracy of the new model is said to be within ½ of 1 per cent. It has a safety factor of 3½ to 1, permitting accidental overloading up to 70,000

DON'T GAMBLE with dust!

Your winning hand is Pangborn Dust Control!

If your operating costs are high due to uncontrolled dust, your best bet is Pangborn Unit Dust Collectors! Designed to give thorough, efficient dust control at an individual operation, they require little floor space and can be located anywhere. Pangborn Dust Collectors save you money by:

- **Reclaiming valuable material**
- **Reducing dust damage to expensive machinery and finished products**
- **Cutting plant housekeeping costs**
- **Speeding production—improving working conditions**

Investigate Pangborn Unit Dust Collectors now! Shipped assembled . . . $545 and up.

For additional information, write: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Dust Control and Blast Cleaning Equipment.*

Pangborn

CONTROLS DUST

Here, sir, is the story of Haylco Automatic Sand Control (The

HARTLEY HYGRO-GUIDE, HARTLEY TIME GUIDE, BOND GUIDE . . . . and SAND LEVEL CONTROL)

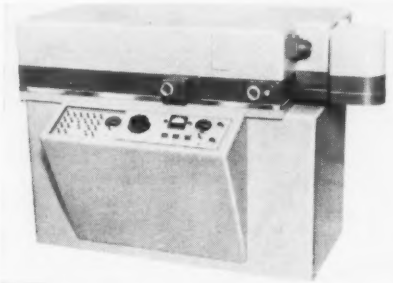
PUT YOUR FOUNDRY OUT IN FRONT —use the HARTLEY HYGRO-GUIDE to automatically control the moisture in your prepared molding sand—the HARTLEY TIME GUIDE to automatically control all phases of your mixing cycle—the BOND GUIDE to automatically add the dry bond and carbonaceous materials uniformly —the SAND LEVEL CONTROL to automatically control the feeding of molders hoppers with sand.

Now I ask you sir, would you like to reduce your scrap, increase your profits & production? Really worth investigating, isn't it? Call or write:

HAYLCO CONTROLS Corporation
NEENAH, WISCONSIN
The original manufacturer of automatic controls for sand systems.

lb with safety and without damage to calibration. Unit is 6¼ x 18¼ x 2⅝ in. Net weight is 20½ lb. Switch is used with 110 or 220/440-v power.
For More Details Circle No. 39—Page 315

Spectrochemical Instrument: Applied Research Laboratories, San Fernando Rd. and Palmer, Glendale, Calif. — Spectrochemical instrument

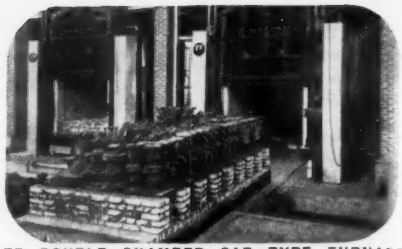


is said to combine the features of a spectrograph, a monochromator and the company's quantometer and perform the complete functions of each. According to the manufacturer, the machine incorporates the advantages of three concepts of spectrochemistry: Photography of spectra for complete analysis, polychromatic spectrometry for direct-reading quantitative analyses, and monochromatic spectrometry for qualitative and quantitative analyses.
For More Details Circle No. 40—Page 315

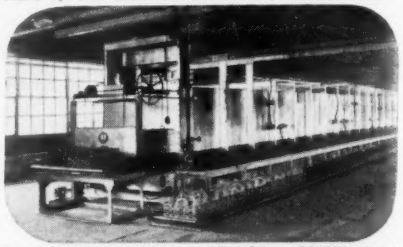
Nonmarking Hammer: Little Beaver Industries, Willoughby, O.—Aluminum-magnesium hammer fea-

tures a 13 per cent elasticity factor, is nonmarking, reportedly will not chip or shear and can be dressed repeatedly. It is being produced in sizes from 1 to 5 lb. Manufacturer claims breakage and fracturing are eliminated because strength and flexibility are built into the tool through integral casting. Dimpled finger grips and accurate positioning of its gravity center reduce accident possibilities and lessen fatigue.
For More Details Circle No. 41—Page 315

Solenoid Valves: Bellows Co., Akron 9, O.—Expanded line includes three-way valves available in ¼, ⅜



EF DOUBLE CHAMBER CAR TYPE FURNACE for annealing castings, equipped with three furnace cars and one transfer car incorporating car puller. Built by The Electric Furnace Co., Salem, Ohio.



EF ELECTRICALLY HEATED CONTINUOUS ROLLER HEARTH FURNACE for the scale-free annealing of various iron alloy castings in special atmosphere. Built by The Electric Furnace Co., Salem, Ohio.

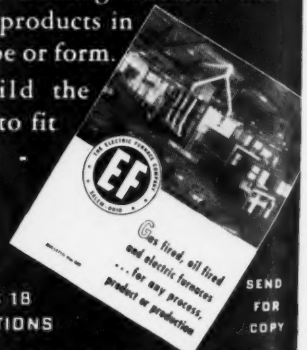
EIGHT EF FUEL-FIRED BATCH TYPE FURNACES, showing gantry crane that handles the large, heavy castings into and out of the furnace and quenching equipment. Built by The Electric Furnace Co., Salem, Ohio.

THE ELECTRIC FURNACE CO. Salem Ohio.
EF
Gas Fired Oil Fired and Electric Furnaces.

Production HEAT TREATING FURNACES

We build production equipment for heat treating ceramics and metal products in any shape or form. We build the furnace to fit the job.

Ask for Bulletin 461-SA



IT SHOWS 18 INSTALLATIONS

SEND FOR COPY

The ELECTRIC FURNACE CO.
Salem - Ohio

Having trouble making ends meet?

Is your 1955 advertising budget slightly small for the big job expected of it?

There are several ways you can s-t-r-e-t-c-h that budget.

1. **By doing something with layout and copy appeals that will step up the effectiveness of the white space you buy.**
2. **By re-evaluating the publication picture in the light of today's opportunities, and comparing the *effective coverage* each magazine gives you per dollars invested.**
3. **By merchandising your advertising to salesmen, distributors' salesmen, and selected prospects to get added impact from each ad.**

The *first* calls for a method of measuring attention and readership. That's where Starch reports can help you. Three Penton publications are regularly "Starched" and reports are available from Daniel Starch & Staff. All Penton publications offer helpful information that will assist you in tailoring your advertising to their audiences.

The *second* involves better yardsticks to aid in space buying. Here, too, Penton can give you a lot of help. For instance, we have standardized on the modern Standard Industrial Classification of the U.S. Census Bureau to aid you in making comparisons. Plant counts, and size of plant, so necessary in determining *effective coverage* are available on *all* of our publications.

The *third* way to stretch your budget—merchandising your advertising—is one in which we are prepared to help you with reprints, direct mail service, and special list selections.

Will you call on us for cooperation?

THE PENTON PUBLISHING COMPANY

PENTON BUILDING • CLEVELAND 13, OHIO

Write our Metallurgical Dept. for FREE Copy of "Producing Leakproof Aluminum Castings."

for better castings

PLUS

higher quality

of finished products

* *specify alloys by*

The George Sall Metals Co., Inc.

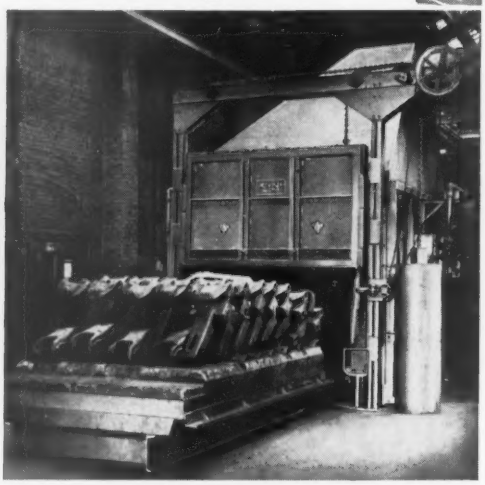
2306 E. Butler St., Phila. 37, Pa.

PRODUCERS OF: *Aluminum, Brass and Bronze, and Zinc Ingot; Hardeners, Z-shot and bar for Zamak production, Salloy, Special Alloys.*

"Better Alloys for Better Castings Thru Creative Metallurgy"

For Normalizing, Annealing and Heat Treating...

JOHNSTON CAR BOTTOM FURNACES



Engineering experience is apparent in the smooth operation of the Johnston Car Bottom Furnace. Roller bearings in car and door hoist shafts, mechanical car seals, and power operated car pullers are just a few of many practical features. Johnston "Reverse Blast" low pressure burners for oil or gas assure clean, economical, efficient heat for annealing, normalizing, and stress relieving.

Write for Bulletin F-240

Johnston Equipment for the Foundry
● Melting Furnaces ● Heating Torches ● Ladle Heaters ● Heat Treating Furnaces ● Burners, Blowers, Controllers
Over Thirty Years Experience in Design and Manufacture.

THE JOHNSTON LINE OF DEPENDABILITY SAFETY

JOHNSTON MANUFACTURING CO.
2825 EAST HENNEPIN AVE. MINNEAPOLIS 13, MINN.

ENGINEERS & MANUFACTURERS OF INDUSTRIAL HEATING EQUIPMENT

and ½-in. sizes for manual or electrical control. A choice of 115, 230 or 440-v operation is offered by these solenoid-controlled, pilot-operated models. Mechanically actuated models include hand lever, clevis, roller, foot pedal and treadle types.

For More Details Circle No. 42—Page 315

Hand Lift Truck: Allied Mfg. & Sales Co., Dept. 2-3, 3113 West Grand Ave., Chicago 22, Ill.—New combination pallet-lift stacker and hand truck is capable of lifting 500 lb and moving loads with perfect balance. It handles heavy motors, dies, patterns, boxes, kegs, castings and bags. Four models, with 8-in. roller bearing rubber wheels, have a hydraulic pump lift which raises the platform from 36 to 54 in. high. Platform sizes are 16 x 20, 19 x 22, and 22 x 30 in.

For More Details Circle No. 43—Page 315

Photosensitive Plate: Metalphoto Corp., 2903 East 79th St., Cleveland 4, O.—Photosensitive aluminum plates are designed for producing working drawings for foundries and forge shops, for engineering, gaging and inspection templates, comparator charts, checking masters for pantograph inspection, master plans for plant layout work or similar applications. All processing reportedly can be done without special equipment other than a sun lamp, a developing tray, and a hot plate for sealing.

For More Details Circle No. 44—Page 315

Platform Truck: Yale & Towne Mfg. Co., 11000 Roosevelt Blvd., Philadelphia 15, Pa.—Low lift platform truck is made in 4000, 6000 and 7500-lb capacities. Strength is achieved through a reinforced frame and heavy platform. Platform is elevated by a 3-in. power lift. Larger unit has capacity for a 23-plate lead battery to provide power. When empty the platform can travel 3

PRECISION

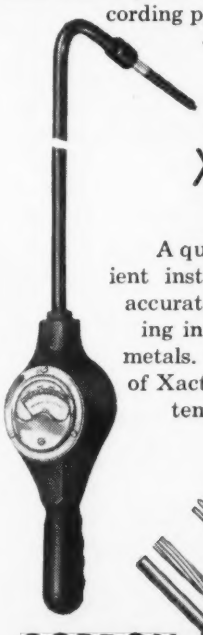
TEMPERATURE

measurement and control

GORDON

XACTLINE

Controls temperature automatically within a fraction of a degree in any heat process. A complete factory-assembled unit ready for installation anywhere. Can be used with any existing indicating or recording pyrometer controller —regardless of age.



GORDON

XACTEMP

Hand Pyrometer

A quality-built, convenient instrument for quick, accurate temperature reading in molten nonferrous metals. Also, other models of Xactemp for all-around temperature checking.

GORDON

SERV-RITE

Thermocouple Wire

Thermocouple Extension Wire

Insulated in Gordon's own plant to assure consistent quality. All standard wire and insulations carried in stock for quick delivery. Other wires, in long or short runs, manufactured to specifications.

Full Particulars on Request

5607

GORDON SERVICE

CLAUD S. GORDON CO.

Manufacturers • Engineers • Distributors

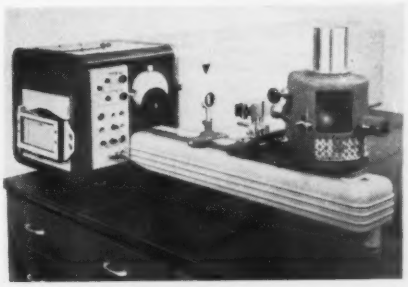
Temperature Control Instruments • Thermocouples & Accessories • Industrial Furnaces & Ovens • Metallurgical Testing Machines

607 West 30th Street, Chicago 16, Illinois
2027 Hamilton Avenue, Cleveland 14, Ohio

mph and with a full load speed is 1.8 mph. Rubber or steel wheels can be supplied.

For More Details Circle No. 45—Page 315

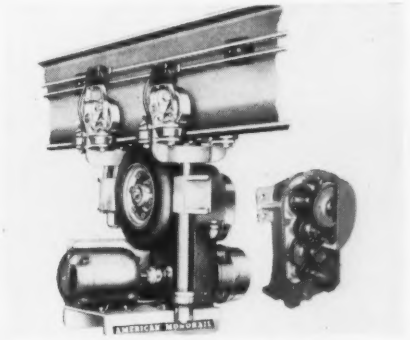
Spectrograph: Bausch & Lomb Optical Co., 635 St. Paul St., Rochester 2, N. Y.—Spectrograph reported-



ly achieves a high degree of speed and versatility through use of two gratings to provide two different spectral ranges in a single exposure on a single plate or on two different plates. Unit's "step-variable" slit system provides a slit which can be opened quickly for cleaning but which is returned automatically to any one of several precise widths with an accuracy of half a micron. Electrical controls either are automatic or semi-automatic. Internal mechanism is dust protected.

For More Details Circle No. 46—Page 315

Drive Unit: American MonoRail Co., 13107 Athens Ave., Cleveland 7, O.—Precision-built drive unit is designed to propel a hoist or other type carrier on a monorail track or crane bridge. Traction is obtained by spring-loaded contact of rubber wheel against bottom of any smooth

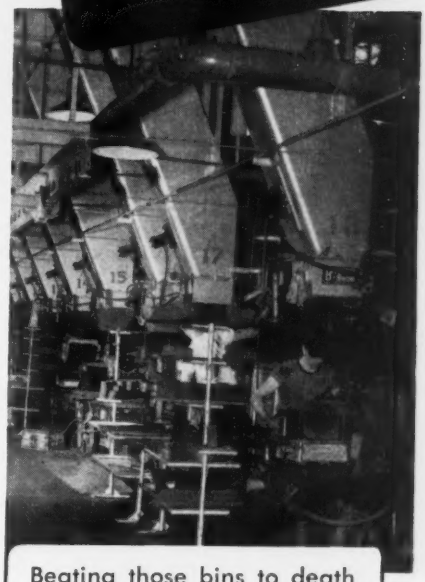


flange track. Speed ranges from 35 to 350 fpm. Power range is from ¼ to 2 hp. Any standard NEMA frame motor can be used. Unit is available with fluid drive for cushioned start.

For More Details Circle No. 47—Page 315

Spectrograph Standards: Jarrell-Ash Co., 26 Farwell St., Newtonville 60, Mass.—Set of eight low-alloy steel spectrographic standards are rods ½-in. in diam by 6 in. long. Standards were issued by British Bureau of Analyzed Samples Ltd.,

BIN STUCK LATELY?



Beating those bins to death with a hammer **might** get your sand moving . . . but it will damage your bins too.

Why not do it the easy, sure way . . . with a CLEVELAND **air** vibrator. There's a size and type, either quiet or standard, for your arching, bridging or sticking problem.

Write for our new catalog No. 109.

THE CLEVELAND VIBRATOR COMPANY

2788 Clinton Ave. • Cleveland 13, Ohio

FORWARD DUMP BARROWS for FOUNDRIES

No. 102-A Barrow. Single steel wheel with 2" face, 16" diameter and 12 spokes.

No. 113-A Barrow. Two steel wheels with 2" face, 18" diameter and 10 spokes.

Here are two well-balanced charging Wheelbarrows for heavy duty foundry service. Handle loads up to 1000 lbs. Sturdy, welded, all-steel construction. Single wheel or double wheel. Available with zero pressure cushion type wheels or 4 ply pneumatic tired wheels with roller bearings. Immediate shipment.

Write for Circular No. 58.

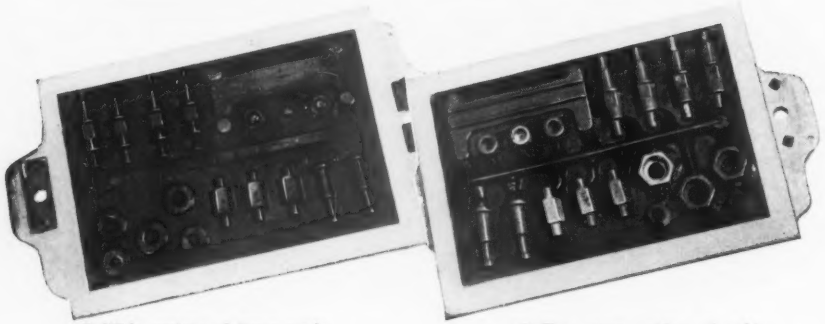
Sterling
FOUNDRY EQUIPMENT
STERLING WHEELBARROW COMPANY • MILWAUKEE 14, WIS., U. S. A.

A 5792-⅓

"NUISANCE" JOBS SOLVED!

No wonder they call it . . .

SUPER TAMASTONE



● Wide variety of items made into combination match plate with metal patterns mounted in drag side.

● The cope side of this "nuisance" job is made entirely of SUPER TAMASTONE.

How SUPER TAMASTONE solved a "nuisance" job!

From single loose wooden patterns furnished by customer, white metal ones were made in multiples to balance out a short combination run. By converting these loose pattern odds and ends into a SUPER TAMASTONE Match Plate, the customer received work in record time at a big savings! The foundry was happy, too, another "nuisance" job out of the way, and profitably!

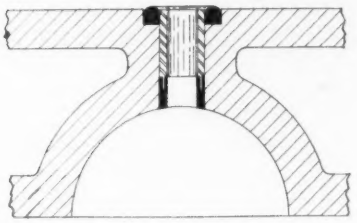
Super Tamastone will work wonders in your foundry too! Write!

TAMMS INDUSTRIES, INC., 228 N. La Salle St., Chicago 1, Ill.

and prepared by Edgar Allen & Co. Ltd., Imperial Steel Works, Sheffield, England. Individual certificates accompany the standards and the results of the analyses are tabulated and averaged and their analytical techniques outlined.

For More Details Circle No. 48—Page 315

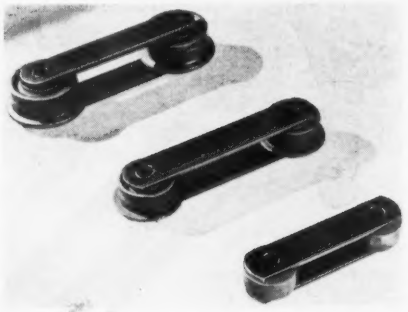
Sealing Rings: Martin Engineering Co., Neponset, Ill.—Sealing rings for foundry use are designed to seal



around liner tubes in corebox blow holes. Protection against blow-by or blow-out reportedly is positive. Life expectancy is claimed to be almost unlimited. No adhesive is needed to hold rings in place. Rings also are used to seal around vent rods. Twenty-one sizes from ¼ to 1½ in. ID are available.

For More Details Circle No. 49—Page 315

Side Chain: May-Fran Engineering Inc., 1692 Clarkstone Rd., Cleveland 12, O.—Side chain is for use with the company's hinged steel conveyor belting and can be used in



applications including slat or apron conveyors as well as drag and open type chain conveyors. Chain is available in 2½, 6 and 9-in. pitches. Working load capacities range from 1250 lb per strand for the 2½-in. pitch size up to 6750 lb per strand for the 9-in. pitch size. When desired, single strand rollers can be provided.

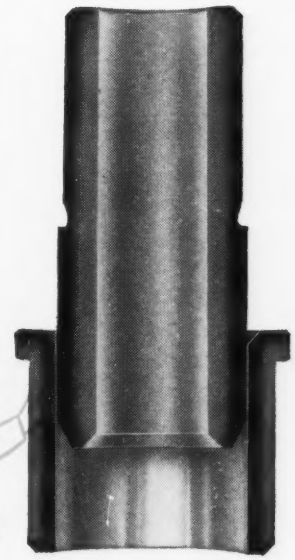
For More Details Circle No. 50—Page 315

Acid Detergent: Oakite Products Inc., 127B Rector St., New York 6, N. Y.—Acid detergent for pickling and scale-removal operations in metalworking plants is said to remove light to moderate rust, heat scale, tarnish and other oxides as well as normal shop dirt and meet specification MIL-M-10578A, Type III.

For More Details Circle No. 51—Page 315

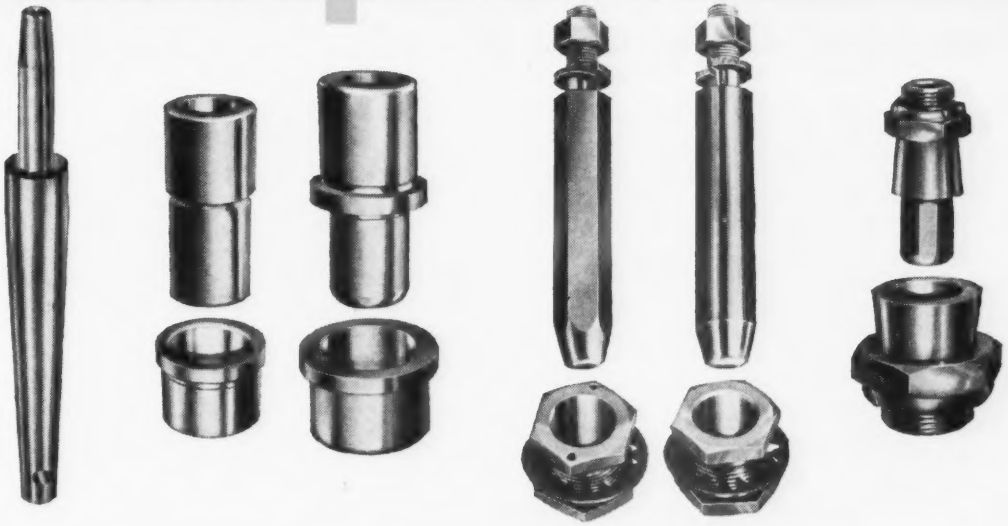
designed like an ARMADILLO

hardened wearing surfaces and ductile cores increase life of UNIVERSAL flask pins and bushings

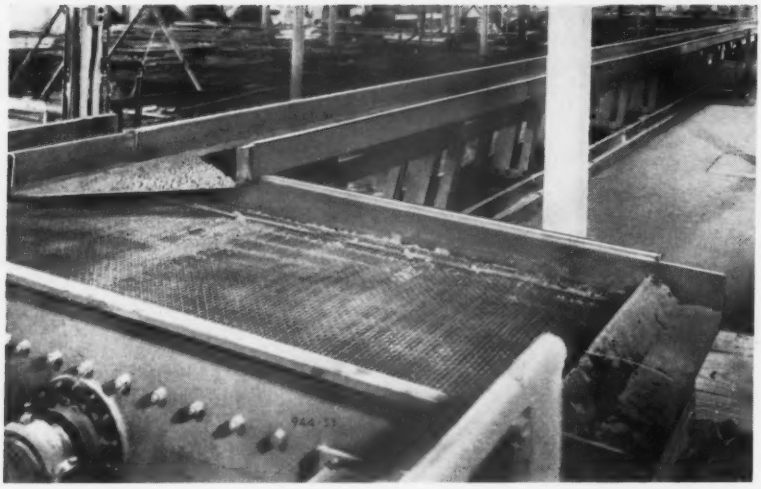


Universal flask pins and bushings are double quenched and double drawn to produce strong, ductile cores with a fine grain structure to enable them to withstand considerable stress, strain and rough treatment in the foundry without breaking or chipping. The wearing surfaces of both pins and bushings are carburized and hardened to improve their wearing qualities and prolong their life. Universal flask pins and bushings are precision ground to extremely close tolerances to help assure instant, accurate alignment of cope and drag. Plain or taper, round or hexagonal and threaded or plain types are available in a complete range of sizes. For complete information, write to the office nearest you — Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Avenue, Kenosha, Wis. — or the home office.

175



UNIVERSAL ENGINEERING COMPANY FRANKENMUTH 4, MICHIGAN



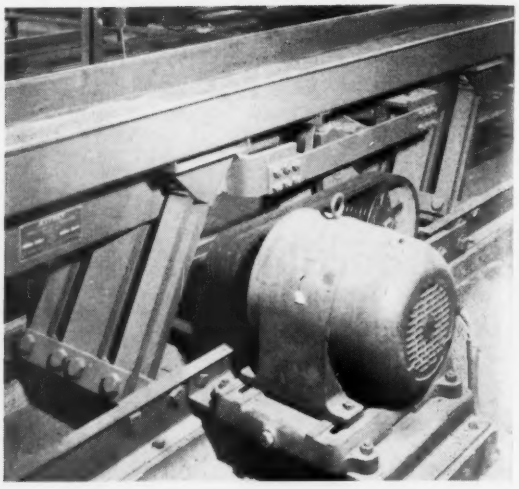


Fig. 1 (left) — Mechanical vibrating conveyor at Pennsylvania foundry delivers to vibrating shakeout grizzly. Fig. 2 (right) — Motor drive for conveyor is shown here

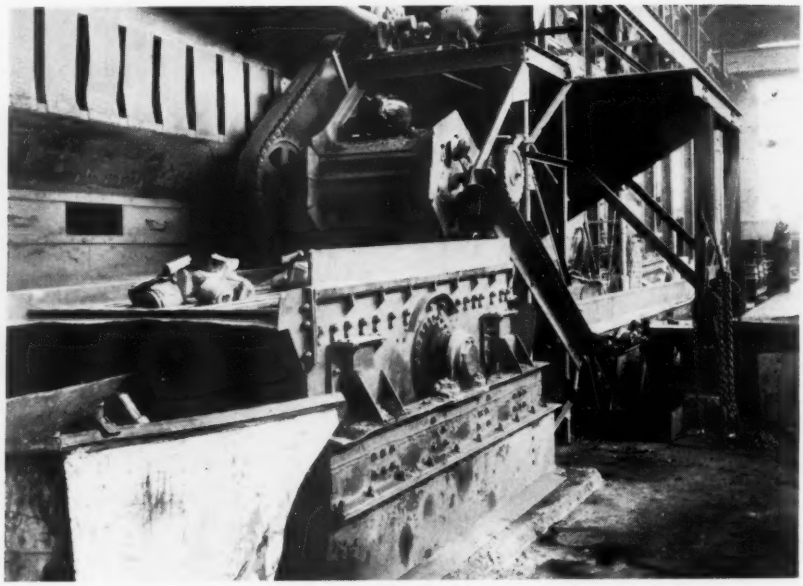


Fig. 3 (left)—Skirts on right side of conveyor prevent spillage. Fig. 4 (right)—Conveyor (rear) delivers material to apron conveyor which discharges into shakeout

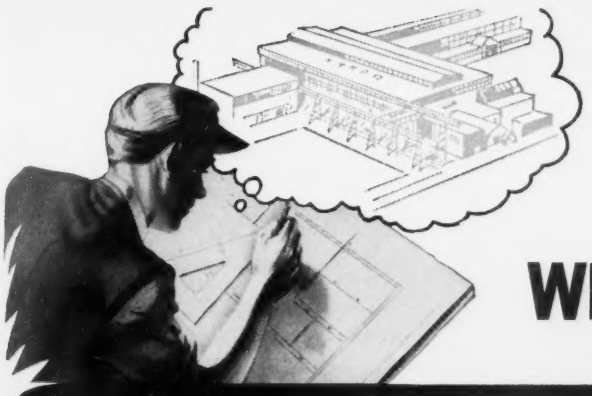
Vibrating Conveyors Handle Hot Materials

By FRANCIS A. WESTBROOK

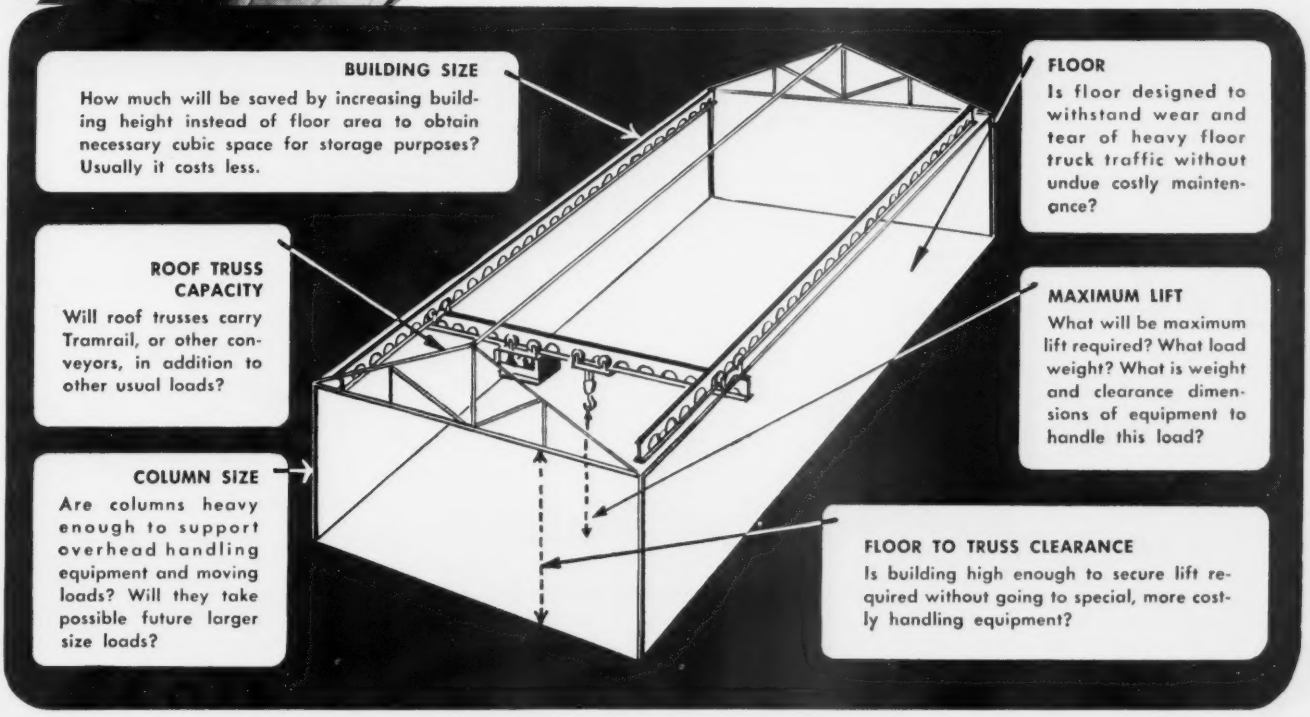
MECHANICAL vibrating conveyors are being used more and more in foundries because they are well adapted for handling hot and abrasive materials at low operating and maintenance costs and at speeds which are adequate for the conditions they have to meet. Two recent installations indicate clearly the advantages that can be realized in actual practice.

One of these installations was made by a foundry in Pennsylvania. In this case the conveyor is 80 ft long and extends along the foundry to a vibrating shakeout grizzly, as shown in Fig. 1. The conveyor deck is 24 in. wide and 6¼ in. deep. Poured molds are dumped into it, and the vibrating action separates much of the sand from the castings as they travel along. A large proportion of the heat is dissipated at the same time. Final separation of sand and castings takes place at the vibrating shakeout. The castings then drop into a box, and the sand passes through the grizzly. The conveyor is powered by a totally enclosed, fan-cooled motor with a multiple V-belt drive (Fig. 2).

Fig. 2 also shows construction of the conveyor's moving parts, which consist of cantilever spring bars and counterweights which balance the weight of the deck. In addition, the spring bars are so designed as to number and weight that they provide a close approximation of the natural frequency of the conveyor compared with the speed of the drive. This feature holds power requirements to a minimum—that is, with the counterweight mounted below the conveyor deck and vibrating in the opposite direction to the deck, the forces at the base mounting point of the cantilever spring bars are equal and opposite. Vertical and hori-



Don't Forget *Materials Handling* When Designing the Building


BUILDING SIZE
How much will be saved by increasing building height instead of floor area to obtain necessary cubic space for storage purposes? Usually it costs less.
ROOF TRUSS CAPACITY
Will roof trusses carry Tramrail, or other conveyors, in addition to other usual loads?
COLUMN SIZE
Are columns heavy enough to support overhead handling equipment and moving loads? Will they take possible future larger size loads?
FLOOR
Is floor designed to withstand wear and tear of heavy floor truck traffic without undue costly maintenance?
MAXIMUM LIFT
What will be maximum lift required? What load weight? What is weight and clearance dimensions of equipment to handle this load?
FLOOR TO TRUSS CLEARANCE
Is building high enough to secure lift required without going to special, more costly handling equipment?

The foremost demand of a new factory building, whether for production or storage, is that its design and construction aid overall operating efficiency to the utmost. Thus, the building becomes more than just an enclosure, but is actually a vital part of the manufacturing process.

It is, therefore, imperative that the various steps entering into the making of an item be thoroughly considered when the building is designed. One of the most important of these concerns materials handing because this item often amounts from 25% to 50% of the total production cost, and, also, because it is plant-wise in nature.

Regardless of what handling methods are deemed best, overhead cranes or Tramrail, roller or chain conveyors, floor trucks, etc., the building design, size and construction usually has a tremendous bearing on the ultimate handling efficiency secured. Building clearances, floor construction, column locations, aisleway allowances and other factors must be considered for the different handling methods for most satisfactory results.

For initial economy in installation, for most satisfactory operation and highest efficiency, plan for materials handling when you design the building. ***Do not make materials handling an afterthought.***

GET THIS BOOK!
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3873 East 284th Street, Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

A "ROUND TRIP" ticket for a "SINGLE FARE!"

PALLET RAISER

MOLD DUMP

Just think of the improvement!

The Nomad way dumps the molds, stores the pallet on a lower level, and, when needed, the pallet is raised — ready for work.

You save money in so many ways. First of all, you reduce the number of men required to dump molds and to stack equipment. With so much hard, manual labor removed, the man on the job is fresher and has a higher hourly output. And that's money in your pocket!

Write for more information on these time-saving money-makers.

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zontal reactionary forces are eliminated, and, since the restoring force of the spring bars constitutes the main drive force, the motor need only maintain the balanced forces and provide what relatively little additional power is necessary to operate the conveyor. No special vibration-isolating mounting is needed for the main frame. Fig. 2 shows how lightly lagged it is to the floor.

The drive mechanism under the conveyor has been designed to prevent dirt and abrasive material from working into the main bearings and those of the crankshaft. These bearings operate partially submerged in oil and are continuously splash-lubricated.

The other mechanical vibrating conveyor installation referred to earlier is in the new addition to Atlantic Foundry, Akron, O., which was engineered and installed as part of a complete handling system. In this instance the conveyor is located on one side of the area and is served by a series of pallet conveyors at right angles to it. Skirts have been placed on the right-hand side of the conveyor (as viewed in Fig. 3) to prevent spillage, but are not attached to the conveyor deck.

Mounted in Trench

The conveyor is a standard unit 82 ft long by 32 in. wide, and its deck is made of ⅜-in. steel. The whole conveyor is mounted in a trench so that most of it, except the deck, is below floor level, at the right height for dumping the molds. The molds handled by this conveyor are up to 30 in. square and weigh from 350 to 400 lb.

Material is moved at the rate of 80 tons per hour when the conveyor is traveling at 30 fpm. It discharges to a leakproof steel apron conveyor which elevates the material to the shakeout, as shown in Fig. 4. Sand is recovered beneath the shakeout by an electric vibrating conveyor which feeds a glass-fiber belt conveyor. This unit drops the sand off a magnetic pulley into the sand preparation system. Castings drop into front-dumping hoppers, in the left foreground of Fig. 4, in which they are transported to the cleaning rooms by fork lift trucks.

The vibrating conveyor fits in with the entire production line system of the foundry and is an integral part of it. It is employed for those conditions for which it is particularly well adapted—namely, the handling of hot, abrasive materials.

The illustrations which accompany this article are presented through the courtesy of Jeffrey Mfg. Co., Columbus, O.

NARCOLINE

slag-resistant plastic refractory

First step — Jackson lining ladle bottom with Narcoline.

Pinning slab of Narcoline at side of ladle. Below—Completed job.

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TRADE . . Publications

For More Details Use Reply Card—Page 315

MAGNETIC SEPARATORS: Eriez Mfg. Co., Erie, Pa.—Informative, nontechnical booklet B-213 features descriptions of how magnetic ideas have been applied with engineering know-how to solve many vexing problems in innumerable industries. Illustrated case histories show how various companies are using permanent, nonelectric magnets to prevent iron contamination in their products, protect their machinery from damage by tramp iron, or prevent fires.

For More Details Circle No. 141—Page 315

BELT GRINDER & POLISHER: Grinding & Polishing Machinery Corp., 2530 Winthrop Ave., Indianapolis 5, Ind.—Equipment description, applications, operation and maintenance data, standard equipment and specifications of abrasive belt grinding and polishing unit are contained in bulletin.

For More Details Circle No. 142—Page 315

VENTILATION SYSTEMS: American Agile Corp., P.O. Box 168, Bedford, O.—Brochure is designed to aid companies in selecting and installing corrosion-proof poleythylene ventilating and exhaust systems. Components and fittings are completely prefabricated. One section covers possible complete installations and another covers such components as polyethylene seamless ducting, duct fittings, exhaust hoods, centrifugal fans and weather caps.

For More Details Circle No. 143—Page 315

ELECTRIC TRUCK: Yale & Towne Mfg. Co., 11000 Roosevelt Blvd., Philadelphia 15, Pa.—Bulletins 5111, 5112, and 5113 describe all the specifications and features of company's 2000, 3000 and 4000-lb capacity electric, stand-up, hydraulic lift trucks, respectively. Trucks are available in 68, 83, and 90-in. overall heights with telescopic lifts up to 100, 130 and 144 in. respectively.

For More Details Circle No. 144—Page 315

COPPER - ALUMINUM ALLOY: Alcaloy Inc., 13124 Shaker Square, Cleveland, O.—Catalog describes and illustrates copper-aluminum alloy and products made from this alloy. Alloy is claimed to be nonsparking, nonmagnetic and highly resistant to corrosion. General information is provided along with specific data for engineers.

For More Details Circle No. 145—Page 315

ADJUSTABLE SPEED DRIVES: American Pulley Co., 4200 Wissahickon Ave., Philadelphia 29, Pa.—Engineering catalog presents data on single-groove, wide range, adjustable speed drive available in belt sections with groove sheave pitch diameters from 5.0 to 8.5, 5.5 to 10.0 and 5.5 to 11.0

For More Details Circle No. 146—Page 315

ROTARY TOOLS: M. A. Ford Mfg. Co., Davenport, Iowa—Recommended operating speeds and other operational data and engineering specifications of carbide cutters, end mills, grinding burrs and sets, high speed tool steel countersinks, ground cutters, rotary files, and rotary rasps are contained in catalog 207.

For More Details Circle No. 147—Page 315

CONTROLLERS: Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa.—Information about indicators, recorders and controllers is given in a series of five data sheets, ND46-33(100) to (104). These data sheets tell how the instruments can

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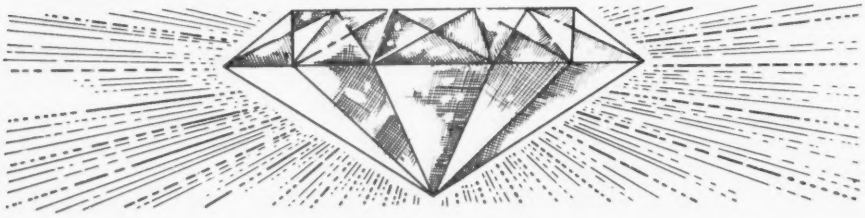

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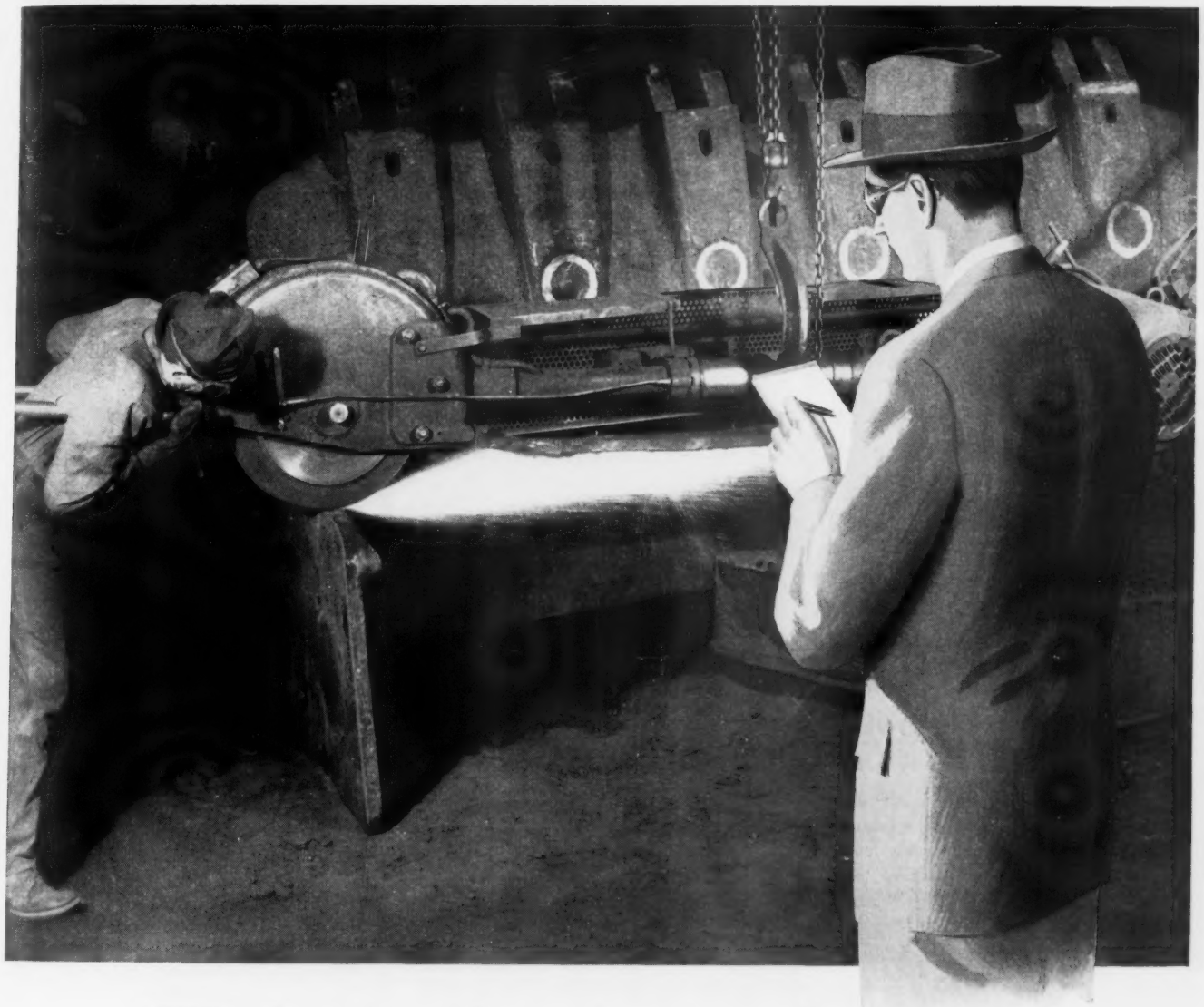

Picture of a man about to cut GRINDING COSTS

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Will the wheels stay sharp with a minimum of dressing?
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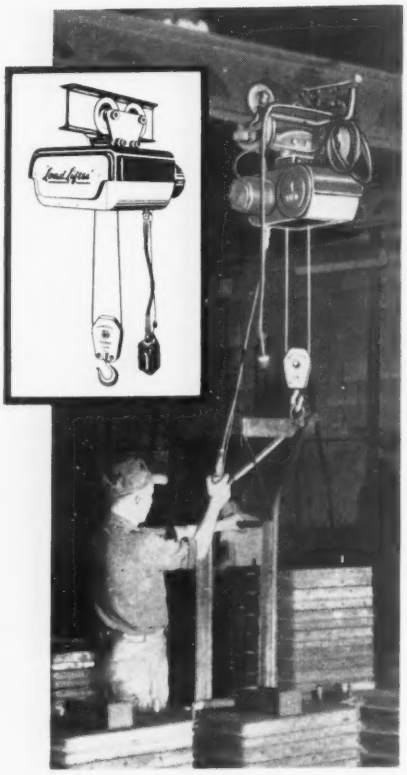

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be used to indicate or record temperature, or to provide two-position or proportioning control.

For More Details Circle No. 148—Page 315

ELECTRIC ARC FURNACE: National Carbon Co., Division of Union Carbide & Carbon Corp., 31 East 42nd St., New York 17, N. Y.—Vol. 2, No. 1, Mar., 1955, issue of *Carbon and Graphite News* presents a feature article, "Flexibility of the Electric Arc Furnace—What It Means to the Steel Producer," by E. A. Hanff. Article contains an accumulation of knowledge acquired from many years of association with the steel industry and extensive experience in equipment building.

For More Details Circle No. 149—Page 315

COMPRESSORS: Worthington Corp., Advertising & Sales Promotion Department, Harrison, N. J.—Installation and maintenance guide for nonportable compressors covers the topics of location, foundation-shaking forces, soil considerations, foundations, piping, location of inter and aftercoolers and receivers, lubrication, inspection and maintenance. Bulletin RP-725 includes illustrations of cut sections.

For More Details Circle No. 150—Page 315

BATCH OVENS: Blue M Electric Co., 138th & Chatham St., Blue Island, Ill.—Condensed construction description of industrial batch ovens, air draw furnaces, box type muffle furnaces high-temperature recirculating ovens and a self-contained portable electronic temperature control unit is included in bulletin 5510. Sizes, operating ranges, power requirements and prices are included.

For More Details Circle No. 151—Page 315

AIR POWER SYSTEM: Ingersoll-Rand, 11 Broadway, New York 4, N. Y.—Engineering service bulletin, 213-A, points out that power losses in compressed air lines are often as much as 30 to 50 per cent and describes how to determine if more air is being wasted than the repair and renovation of the distribution system would cost.

For More Details Circle No. 152—Page 315

MATERIALS HANDLING: Lansing Co., 660 Cedar St. N., Lansing 3, Mich.—Catalogs H-53, P-53, and B-53, covering hand trucks, platform trucks and wheelbarrows, respectively, are combined in folder. General information on sizes and specifications are included.

For More Details Circle No. 153—Page 315

WHEEL BELT GRINDER: B & E Mfg. Co., 407 Liberty St., Kansas City, Mo.—Illustrated in-use applications, specifications and information on versatility of contact wheel belt grinder are included in folder.

For More Details Circle No. 154—Page 315

AIR CONTROL VALVES: Airmatic Valve Inc., 7317 Associate Ave., Cleveland 9, O.—Sixty-six page catalog presents company's entire line of 2, 3, and 4-way air control valves for high or low pressure installations. Each type valve, cylinder and strain-

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er is handled separately. Information on each unit's outstanding features, application data, dimensions, specifications and parts list breakdown is provided.

For More Details Circle No. 155—Page 315

SMALL PARTS HANDLING: Chas. Wm. Doepke Mfg. Co., 8839 Blue Ash Rd., Rossmoyne, O.—Catalog DN-1000 illustrates, describes and gives specifications of line of nest-stacking boxes and baskets, rollover hoppers, hopper rack assemblies and shelf racks. Used singly or in combinations, these units are designed to eliminate rehandling, simplify parts control, expedite workplace supply and recover lost floor space for productive use.

For More Details Circle No. 156—Page 315

WELDING SUPPLIES: Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.—New 36-page catalog covers a complete line of arc welding and oxyacetylene welding supplies and accessories. The catalog, ADC 848, includes welding rods, fluxes, brazing alloys, goggles, helmets, shields, electrode holders, protective clothing, cable, clamps, hose, lighters and cylinder trucks in its coverage.

For More Details Circle No. 157—Page 315

AIR CYLINDERS: Miller Fluid Power Co., 2040 North Hawthorne Ave., Melrose Park, Ill.—Bulletin A-105K gives design, construction, engineering, mounting and dimensional data on 200 psi heavy duty air cylinders from 1½ in. through 14 in. bores in strokes through 22 ft and 17 standard mounting styles. This bulletin supersedes bulletin A-105G.

For More Details Circle No. 158—Page 315

NYLON PRESSURE TUBING: Polymer Corp. of Pennsylvania, Reading, Pa.—Product bulletin describes flexible nylon tubing and outlines its uses. Information is provided on the material's advantages, characteristics and properties. Cost and installation data also are included. Illustrations accompany the engineering information.

For More Details Circle No. 159—Page 315

WIRE STRAIGHTENING: Lewis Machine Co., Dept. 5J, 3441 East 76th St., Cleveland 27, O.—Machines for straightening and cutting wire are described in bulletin 55-2. Features of the machines are pointed out and a chart aids in the selection of the proper machine for production requirements.

For More Details Circle No. 160—Page 315

EYE PROTECTION: United States Safety Service Co., 1217 McGee St., Kansas City 6, Mo.—Illustrated folder covers lightweight, all-plastic safety spectacles that feature shatterproof prescription safety lenses. Frames are supplied in blue, bronze and burgundy colors.

For More Details Circle No. 161—Page 315

PREHEAT TEMPERATURES: Tempil Corp., 132 West 22nd St., New York 11, N. Y.—Welding preheating

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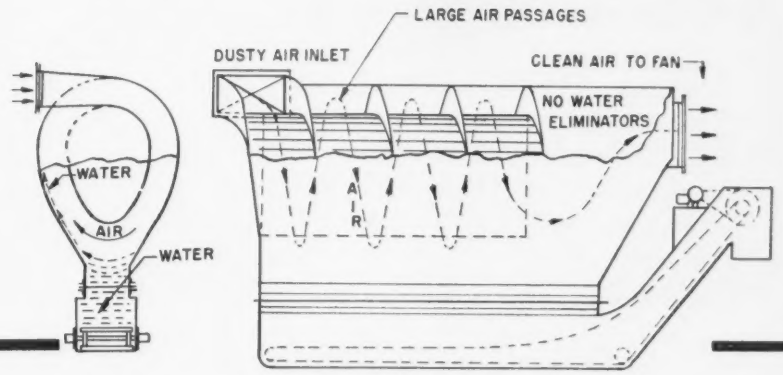

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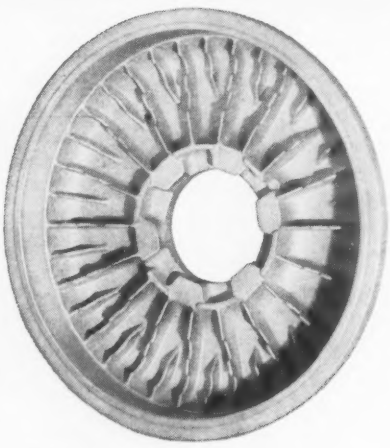

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temperatures for 79 commonly used metals and alloys are given in a chart. Compositions of metals and recommended preheat temperatures are given.

For More Details Circle No. 162—Page 315

HANDLING EQUIPMENT: Brumeler Steel Products Corp., Iona Ave. & Frank St., Grand Rapids 2, Mich.—Bulletin 550 contains information on line of boxes, hoppers, pallets and skids for materials handling. A variety of styles are made to meet specific handling requirements but any gage, dimension or style is considered to be standard. Crane lugs, stacking pads, choice of runners and skids or casters help fill special needs.

For More Details Circle No. 163—Page 315

INSULATING MATERIAL: Johns-Manville, 22 East 40th St., New York 16, N. Y.—Illustrated booklet IN-153A gives information on a structurally strong sheet material which reportedly both builds and insulates. Handling and working recommendations, construction and fabrication suggestions, data on physical and thermal properties and photographs showing in-use applications are included.

For More Details Circle No. 164—Page 315

FILTERS-LUBRICATORS: Arrow Tools Inc., 1900 South Kostner Ave., Chicago 23, Ill.—Sizes, dimensions and engineering data on company's autopneumatic controls, air line filters, air line lubricators, pressure regulators and drain traps with accessories are included in booklet. Performance charts and replacement parts lists also are given.

For More Details Circle No. 165—Page 315

CABINET OVENS: Young Bros. Co., Dept. O, 1831 Columbus Rd., Cleveland 13, O.—Bulletin 10-S illustrates and describes a wide range of standard cabinet ovens for use with gas, electric or steam heat involving temperatures up to 600° F. Structural features, dimensional and capacity data are included.

For More Details Circle No. 166—Page 315

LUBRICATION CHART: E. F. Houghton & Co., 303 Lehigh Ave., Philadelphia 33, Pa.—Two-color wall chart on varnished stock covers lubrication recommendations for hydraulic systems, spindles, air compressors, reduction gears, electric motors, oven conveyors and other general uses.

For More Details Circle No. 167—Page 315

INSPECTION LAMPS: Eder Instrument Co., 2293 North Clybourn Ave., Chicago 14, Ill.—Illustrated folder presents data on several miniature inspection lamps with flexible extensions, mirror and magnifier attachments designed to inspect hard-to-get-at places.

For More Details Circle No. 168—Page 315

OIL SEALS: Albert Trostel Packings Ltd., Lake Geneva, Wis.—One-hundred page catalog primarily of interest to manufacturers of original equipment contains engineering data

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For More Details Circle No. 169—Page 315

CORE BINDERS: Penola Oil Co., 14300 McNichols Rd. W., Detroit 35, Mich.—Company's "Technigram" defines a core binder and presents current information on the requirements that should be satisfied by a good core binder.

For More Details Circle No. 170—Page 315

MATERIAL HANDLING: Economy Engineering Co., 4511 West Lake St., Chicago 54, Ill.—Catalog 55 contains 40 pages of information on materials handling and overhead service machines.

For More Details Circle No. 171—Page 315

CRANE ELECTRIFICATION: Feedrail Corp., 125 Barclay St., New York 7, N. Y.—Advantages of the enclosed trolley busway system of electrification for cranes and hoists are given in bulletin 44.

For More Details Circle No. 172—Page 315

CABLE CONVEYOR SYSTEMS: American Cable-Link Co., 13446 Fenkell Ave., Detroit 27, Mich. — Advantages of cable conveyor systems, load capacities and application photos are contained in a folder.

For More Details Circle No. 173—Page 315

INDUSTRIAL OVENS: Porbeck Mfg. Co., 9th & Warren, St. Louis 6, Mo.—Bulletin points out the design features of company's gas and oil-fired and electric industrial ovens.

For More Details Circle No. 174—Page 315

FOUNDRY reprints

Pyrometry in the Nonferrous Foundry by Robert A. Colton is a reprinting of two articles describing the various influences of temperature control on properties of nonferrous castings. Several types of pyrometers are discussed with information on their care and use.

For a Copy Circle No. 175—Page 315

Statistical Quality Control by A. J. Kukla covers the application of statistical quality control to foundries. Article is about magnesium foundry practice but the principles and benefits described apply to all types of foundries.

For a Copy Circle No. 176—Page 315

Modern Facilities Incorporated in New Ingot Mold Foundry by Edwin Bremer is a detailed description of large, modern mechanized ingot mold foundry capable of producing 275,000 tons of ingot molds annually.

For a Copy Circle No. 177—Page 315

Use of Rice and Oat Hulls as Riser Insulation by S. L. Gertman and R. K. Buhr presents results of experiments using oat and rice hulls as antipiping insulating compounds to prevent skin formation.

For a Copy Circle No. 178—Page 315

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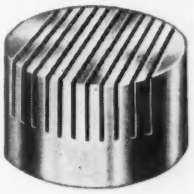
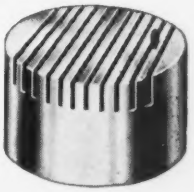
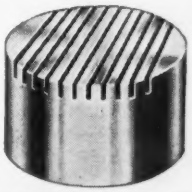


X-TRA DEEP HEAD .156 Wide Slots .014



DEEP HEAD .093 Wide or Narrow Slots .014 .010



SHALLOW HEAD .031 Wire or Narrow Slots .014 .010

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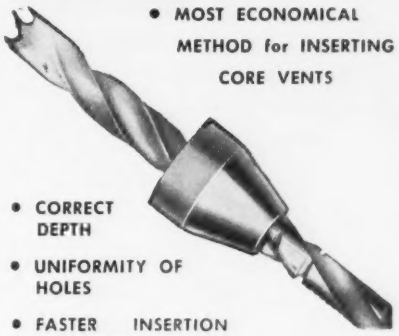

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- UNIFORMITY OF HOLES
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- FOR CLEANING SLOTS
- MADE OF TEMPERED STEEL
- EASY TO USE

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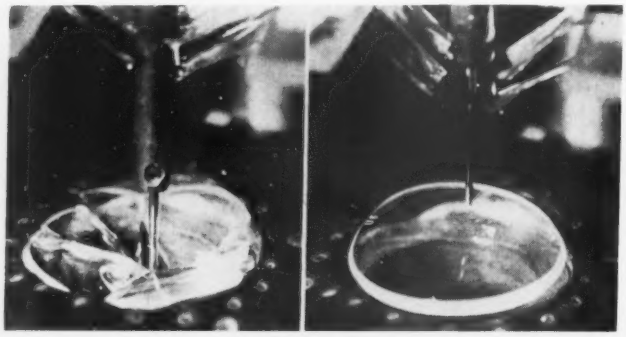
The Shakeout

Safety Lens Material Is Tough

NEW lightweight safety lens material is neither glass nor thermoplastic, but an entirely new type of lens material of compounded resins. In the test shown here, a pencil-shaped 44-gram bar with a steel sewing machine needle in the end was dropped 87 in. in a tube,

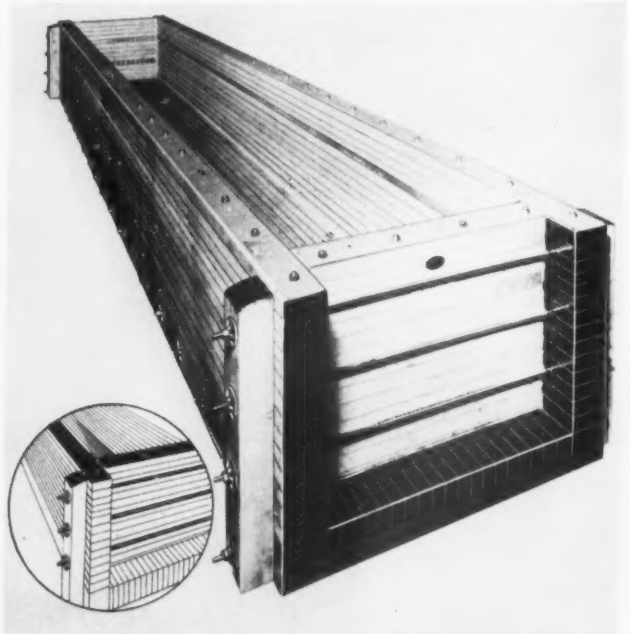


by trigger control, onto the apex of a lens at the rate of 6.5 mil. sec. No specimens fractured, although all lenses of conventional safety glass shattered when tested under the same conditions. Made by United States Safety Service Co., Kansas City, Mo., the new lenses were introduced to industry recently.

For More Details Circle No. 204—Page 315

Pickling Tanks Are Laminated Wood

WOOD TANKS for many years have been used for pickling in the metalworking industry because wood is resistant to acid solutions. Yet, because acid solutions have a dehydrating effect and cause excessive shrinkage in



lesser grades of large "green" timbers and because steel mills and metal processing plants require tanks as long as 60 ft, wood tank construction has not been entirely satisfactory. To meet the requirement for wood tanks that eliminate excessive shrinkage and provide proper strength in long tanks, Wendnagel & Co., Chicago, has pioneered a new laminated construction.

This construction allows the use of tank grade lumber 3 and 4 in. thick. Boards of this thickness can be air dried thoroughly and bolted together to form a tight tank of the shape and size usually employed for pickling.

For More Details Circle No. 205—Page 315

Shell Mold Halves Are Resin Bonded

FAST RESIN BONDING of shell mold halves is achieved at General Electric Co.'s chemical materials department experimental shell molding laboratory at Pittsfield, Mass., through the use of this new shell bonding machine. Foundry technical service engineer Jack E. Bolt is shown placing the hot cope on the hot drag before spring pressure is applied by the machine.

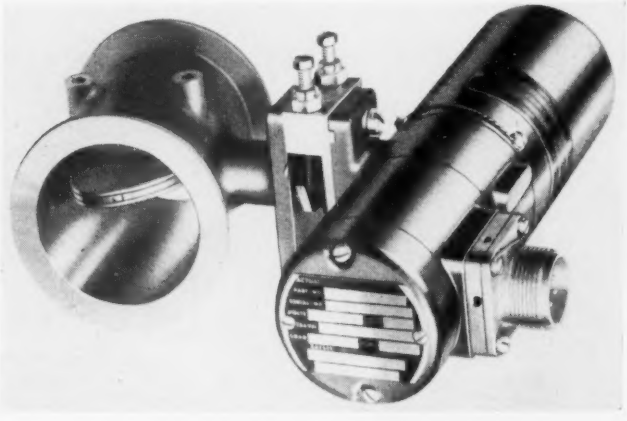
The technique made possible by the unit eliminates a bottleneck in the process which had been caused by the use of mechanical fasteners. Previously, lack of an effective method of joining shell halves slowed production.

In the foreground is a new dimensional-study pattern. Halves are lifted from the pattern and placed on the machine for bonding. Designed to be as nearly complete a laboratory as possible, the General Electric Foundry permits study of all factors which affect the shell molding process.

For More Details Circle No. 206—Page 315

Investment Castings Do the Job

USE OF the investment casting process to produce parts with precise tolerances and lightest possible weight at minimum cost is illustrated by a 2-in. air valve body and



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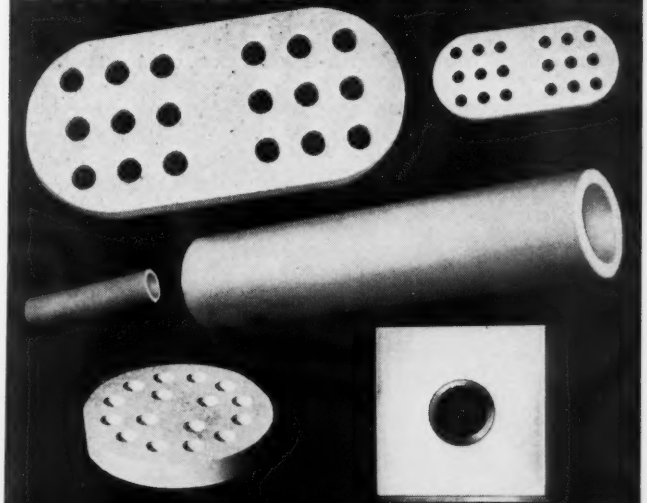

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*U.S. Pat. App. For

disk manufactured by Misco Precision Casting Co., Whitehall, Mich., for Barber-Colman Co., Rockford, Ill. The components are used on electrically actuated air valves designed for temperature and pressure control applications.

If the valves had been fabricated, costs would have been higher, and including the various required bosses would have presented a design problem. Investment casting permitted economical production of thin sections.

In designing the part for investment casting, it was necessary to allow fillets between the various sections and machining stock on the faces and on the valve seat, as well as on the mounting bosses. The parts range in size from 1½ to 2½ in. They are made of type 347 stainless steel and are 100 per cent x-rayed.

For More Details Circle No. 207—Page 315

Cast Gas Meter in Aluminum

THIS ALUMINUM GAS METER weighs only 176 lb and is believed to have the greatest capacity per pound of any industrial hard-case gas meter in the world. Designed for working pressures up to 100 psi, it is only 19 x 27 x 33 in. in its over-all dimensions and can be moved through doors and windows and up and down narrow stairways with ease for sub-basement installations. The meter can accommodate flows of up to 2250 cfh at ½-in. w.c. pressure loss and 5000 cfh at 2-in. w.c. pressure loss with 0.06 s.g. gas.

Stainless steel inserts have been employed to provide corrosion-resistant wearable threads in the index plates on the cover, in the four cap-screw holes at the ends of the body and in both the inlet and the outlet. The unit also is equipped with steel feet ½-in. high, for insulation. All internal parts are interchangeable with previous models. The producer is Rockwell Mfg. Co., Pittsburgh.

For More Details Circle No. 208—Page 315

Slide Posters Boost Safety

NEW TOOL to reinforce efforts of management to develop productive employee attitudes and to reduce manufacturing costs and accidents is full-color, 2 x 2-in. Kodachrome slide-posters. They are projected from behind a special translucent plastic screen in an automatic slide projector which shows a picture 16 x 23 in. The projector unit is about 5½ ft high and occupies floor space 28 in. wide and 18 in. deep.

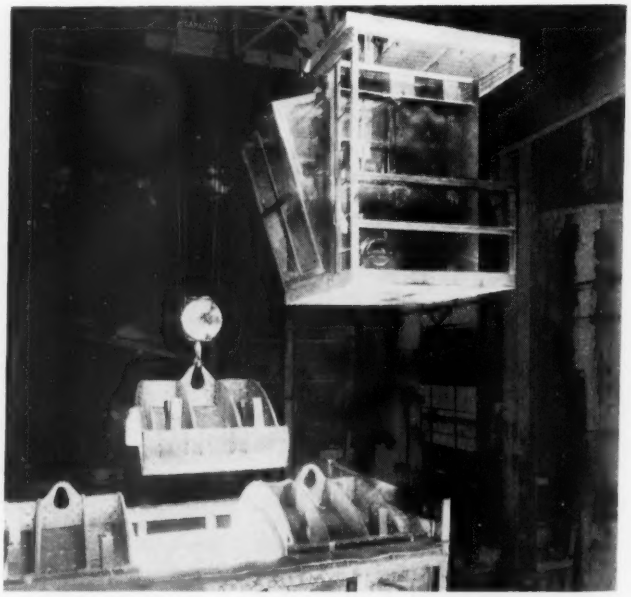
In action, 15 poster slides on a safety subject are mixed with 15 others on a productivity subject. They are shown automatically for 8 or 24 hr daily or at predetermined intervals of an hour or two at lunch periods or shift changes. Each set of slides has an accompanying training guide for use in foreman and supervisor training sessions. A stop-and-go control on the projector permits freezing of any poster-slide at any time. Since the slides are standard size, personnel or safety men can make them too, with a conventional 35-mm camera. The projectors may be purchased on either an outright purchase or a rental purchase plan. Slides are produced by Poster Slide Co., Chicago. A variety of programs is available.

For More Details Circle No. 209—Page 315

Crane Operator is Cool, Man

WITH THE TEMPERATURE below at 2400° F and the weather boiling hot outside, the crane operator nevertheless works in a comfortable 78° F air-conditioned cab at the Rolls Division foundry of Blaw-Knox Co., Pittsburgh.

The cab is equipped with a conditioner, manufactured by Dravo Corp., Pittsburgh, which holds the inside temperature to a comfortable, efficient work level and at the same time removes dust, dirt and noxious fumes from the ventilating air.



For More Details Circle No. 210—Page 315

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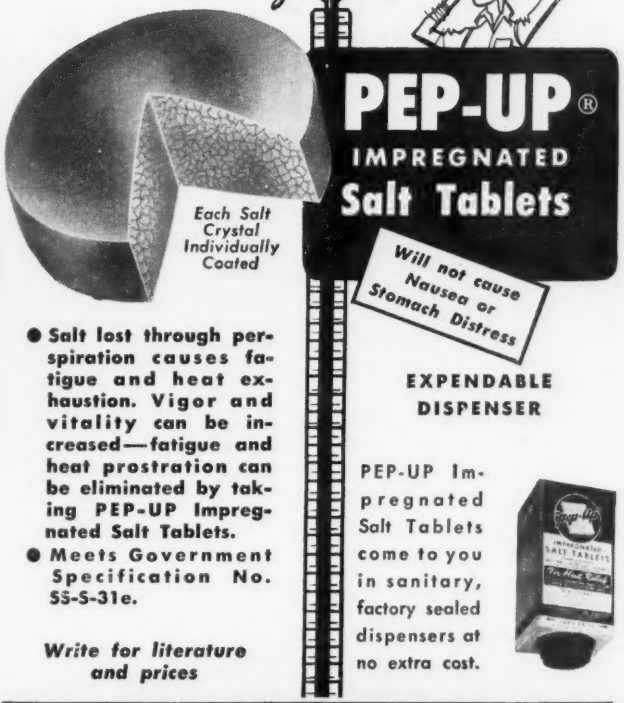

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Better Castings

When used as a purifying flux in aluminum melting, B&A Potassium Fluoborate improves the mechanical and physical properties of the casting, resulting in increased tensile strength, greater elongation, improved machinability. These results are obtained with the addition of just one to four ounces per hundred pounds of metal.

Excellent Oxidation Inhibitors

In magnesium casting, B&A Alkali Fluoborates are used with both green sand and core sand to provide a protective atmosphere which prevents oxidation. Foundries using these fluoborates have obtained better castings with fewer rejects. Also, core making is easier and the resulting cores are faster to collapse and easier to shake out.

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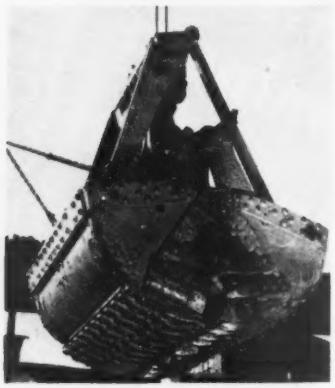


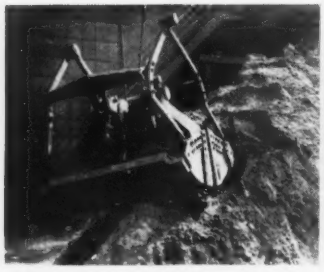
HANDLES COKE WITH MINIMUM DEGRADATION

●

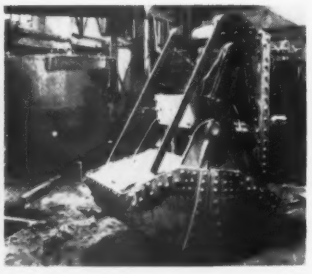
HANDLES SAND WITH MINIMUM LEAKAGE

Blaw-Knox "Shark Tooth" Single-Line Hook-On Buckets are the double-barrelled punch you need to cut the cost of rehandling coke, coal, sand and small limestone, *because they are dual-purpose buckets.* With liner plates attached, you can handle fine granular materials with minimum leakage. Without the liner plates, the "shark teeth" assure minimum degradation of coke.

BLAW-KNOX SINGLE-LINE HOOK-ON TYPE BUCKETS SOLVE AVERAGE OR UNUSUAL HEADROOM CONDITIONS



For extremely limited headroom, this ¾-yd. bucket requires only 6'7" operating headroom. Blaw-Knox Buckets designed for low headroom conditions are also available in larger sizes.



For average headroom, there's a size and type of Blaw-Knox Foundry Bucket to meet a wide range of conditions. Write for Bulletin 2232 for details.

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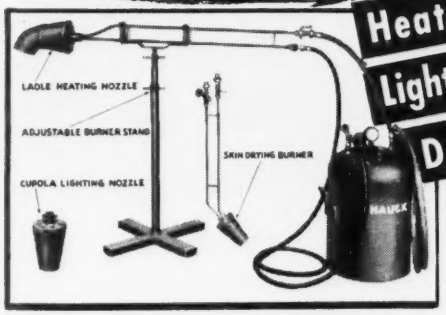

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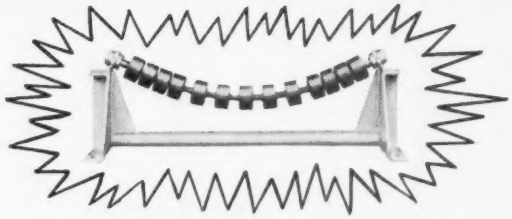

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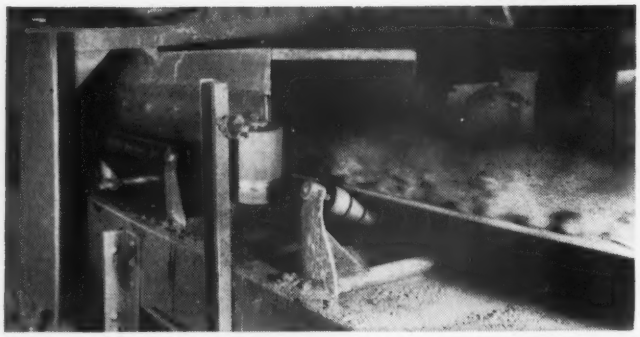

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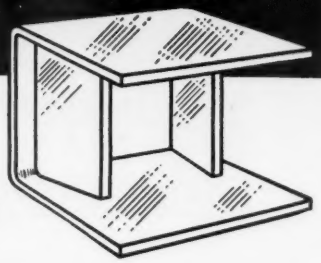

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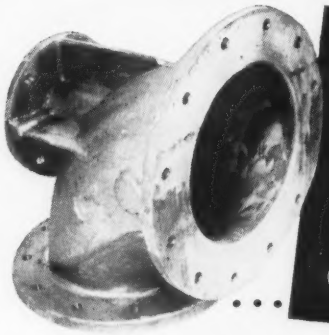

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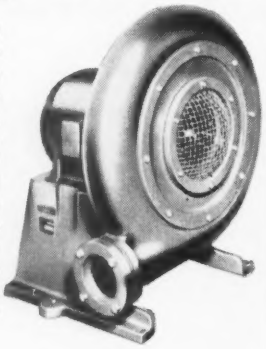
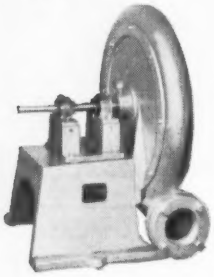


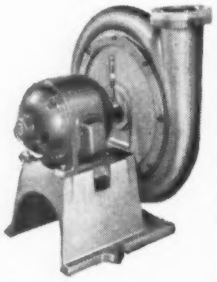


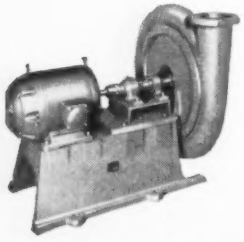
TYPE "P"—PULLEY DRIVE

For operation off a pulley, line shaft, or separate power source, the Type "P" is equipped with special rotor shaft, precision shaft bearings, and pillow blocks—but not pulley. Pulley and drive should be capable of operating rotor shaft at 3450 rpm.

TYPE "S"—SINGLE INLET

For use as an exhauster or for applications in which air intake is from an outside source or through an air filter, the Type "S" has motor side closed off by a close-tolerance plate and felt bushing around motor shaft. Inlet may be threaded or flanged for pipe connection, or air filter. Type "S" construction available for all types of Eclipse Blowers.



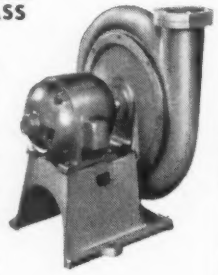


TYPE "D"—DOUBLE BEARING

Provides rigid, precisely aligned bearing support independent of motor bearings because rotor is mounted on special shaft supported by outside auxiliary bearings. The 3600 rpm motor is connected to shaft by a flexible coupling. Special extended base provides maximum rigidity and support. Design permits use of standard length motor shaft in Gas Boosters.

ECLIPSE GAS BOOSTERS ELIMINATE NEED FOR COOLING EQUIPMENT AND BY-PASS REGULATORS

Centrifugal design eliminates need for cooling equipment in by-pass regulators required by positive-displacement boosters. Eclipse Boosters may be operated at partial or full loads, maintaining constant delivery pressure. They're gas-tight and spark-proof . . . designed for continuous trouble-free operation. Use them as a pressure booster on undersized gas lines, or as an air-gas pressure mixer for premix or standby applications. Write for Bulletins K-100 and K-200.



Eclipse Fuel Engineering Co.
1125 Buchanan St., Rockford, Illinois
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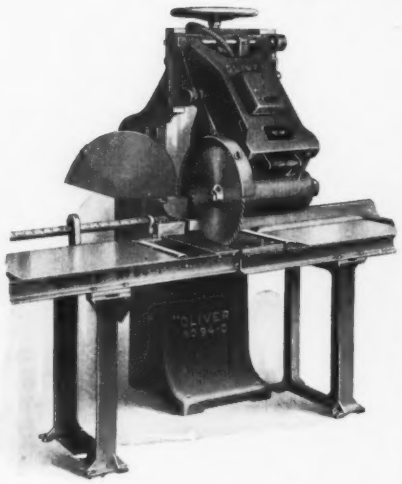
"OLIVER" Cut-Off Saw cuts pattern costs!

It operates by lightest touch, and it's accurate to .005 inch. Most compact!



For ease, speed and accuracy this "Oliver" Cut-Off Saw is unmatched. With a light touch the saw moves in a perfectly straight line. Sturdy and compact. Finest ball bearings are used throughout with tapered roller bearings for suspending arm. Takes saws 10″ to 18″ diameter to cut off or dado stock up to 20″ wide. Write for Bulletin No. 94-D.

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Burning Issues

Eclipse

Published by Eclipse Fuel Engineering Co.
Rockford, Illinois

Good news for die casters

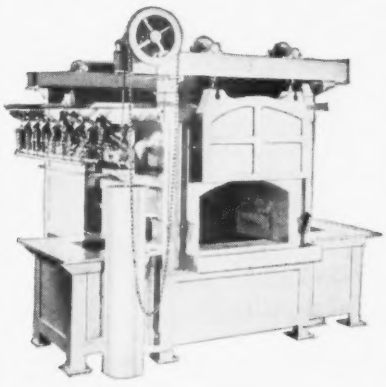
By R. E. HAYDEN

"If you are considering the purchase of melting equipment to produce better aluminum castings easier and reduce your costs, here are some facts worth considering.

"First, the new Eclipse Double-Chamber Dry Hearth Furnace eliminates gas pick-up. Since metal is charged to the dry hearth, all moisture is driven off during the melting process. There is no overheating of metal because the metal flows into the holding bath as soon as it is melted, and the temperature is easily and accurately controlled by a thermocouple in the dip-out vestibule.

"Second, oxide inclusions are eliminated, too, because the small amount of oxide formed is not carried into the molten metal but is left on the hearth where it can be removed at the end of the working day. In fact, there is very little oxide produced because there is no stirring of metal in the holding bath. The slight film formed on top of the metal actually protects molten metal and reduces the amount of oxide produced.

"Third, operator comfort has been designed into every dimension of the furnace. The hearth is only 36 inches from the floor, and only cold metal need be handled. It is easy to clean, and keep clean, because aluminum will not adhere to the brick. Dip-out vestibule, only 30 inches off the floor, is located away from furnace heat. And there is much less heat from the dip-out than from a pot or crucible.



"Fourth, operational and maintenance costs are reduced. Oxide losses are extremely low and scrap loss is less because porosity is eliminated and temperature of the dip-out may be accurately controlled. Fuel costs are reduced, too, because there is no loss of heat through a pot or crucible. There's no pot or crucible replacement, and refractory maintenance is negligible. Let us send you a copy of Bulletin C-80-T describing the variety of sizes and styles available."

R E Hayden

Sales Manager, Furnace Division

Eclipse Fuel Engineering Co., 1125 Buchanan St., Rockford, Ill.
Eclipse Fuel Engineering Co. of Canada, Ltd., Toronto, Ont.

No preheat or postheat was needed to join these two 8300-lb. Ductile Iron castings of this foundry shake-out grate.

Shake-out grate proves

NI-ROD "55" WELDS DUCTILE IRON SOUNDLY

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Use NI-ROD "55" to simplify cast iron welding. *(Nine out of ten jobs will need no preheat or postheat!)* Order a 5 lb. trial package from your supplier today.

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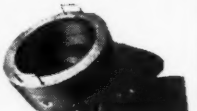
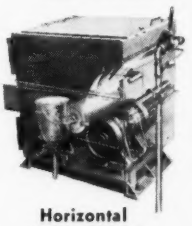
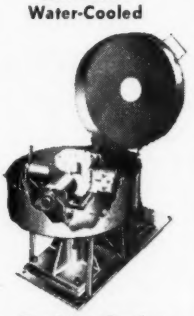
Vertical


Vertical Water-Cooled


Horizontal Water-Cooled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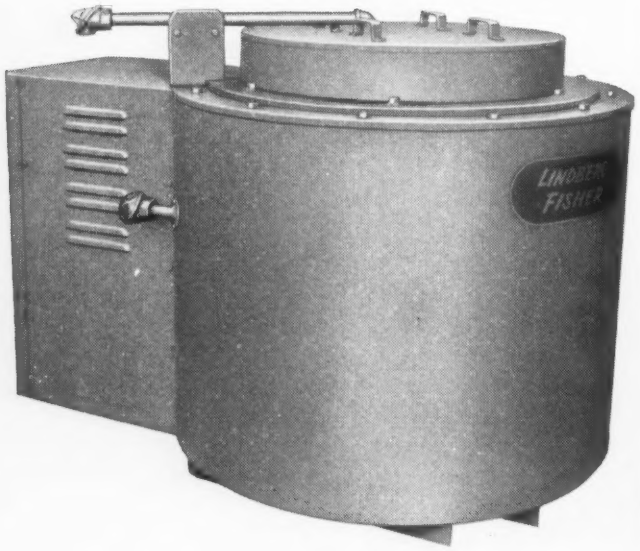

These furnaces eliminate localized heating of metal, eliminate gas absorption, because there are no products of combustion present. Higher production results, due to less operator fatigue. Exhaust fumes and smoke are nonexistent and radiation loss is held to an absolute minimum by use of high quality insulation.

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Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

BRASS AND BRONZE INGOT

Belmont Smelting & Refining Works, 330 Belmont Ave., Brooklyn, N.Y.
Federated Metals Div. of American Smelting & Refining Co., 120 Broadway, New York 5, N.Y.
R. Lavin & Sons Inc., 3426 S. Kedzie Ave., Chicago 23, Ill.

BRINELL TESTING EQUIPMENT

Andrew King, 67 E. Lancaster Ave., Ardmore, Pa.

BRIQUETS—See Type of Compound

BRIQUETTING MACHINERY (Metal)

Milwaukee Foundry Equipment Div., Spo Inc., 3328 Pierce St., Milwaukee 4, Wis.

BRUSHES (Bristle)

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

BRUSHES (Wire)

Hewitt Rubber Division, Hewitt-Robins Inc., 240 Kensington Ave., Buffalo 5, N. Y.

BUCKETS (Elevating, Clam Shell, Drag Line, Grab, Loader, Dumping)

Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Erie Strayer Co., Erie, Pa.
Great Western Mfg. Co., Leavenworth, Kansas.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 14, Wis.

Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Pekay Machine & Engineering Co., 865 N. Sangamon St., Chicago 22, Ill.
Penn Iron Works, Inc., Reading, Pa.

BUILDING and ENGINEERING SERVICE

American Bridge Div., United States Steel Corp., 525 Wm. Penn Place, Pittsburgh 19, Pa.

BURNERS (Acetylene, Oil, Gas, Powdered Coal, Stoker)

Eclipse Fuel Engineering Co., 711 So. Main St. Rockford, Ill.
Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Stroman Furnace & Engineering Co., Div. of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

BUSHINGS—See FLASK BUSHINGS and PINS

CALCIUM BORIDE

Molybdenum Corporation of America, Pittsburgh 19, Pa.

CALCIUM MOLYBDATE

Molybdenum Corporation of America, Pittsburgh 19, Pa.

CARBON BOOSTER

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Great Lakes Carbon Corp., Hancock Bldg., Niagara Falls, N. Y.
United States Graphite Co., Saginaw, Mich.

CARS (Core Oven)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

CARS (Mold Drying)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

CASTING GRIPS (Air Powered)

Joy Mfg. Co., Henry W. Oliver Bldg., Pittsourgh 22, Pa.

CASTING MACHINES (Centrifugal)

Centrifugal Casting Mach. Co., Tulsa, Okla.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

CASTING MACHINES (Permanent Mold)

Centrifugal Casting Machine Co., Tulsa, Okla.

CASTING SEALER—See Impregnating Systems

CASTINGS

City Pattern Foundry & Machine Co., 1165 Harper, Detroit 11, Mich.
Link Belt Company, 307 North Michigan Ave., Chicago 1, Ill.
Wellman Bronze & Aluminum Co., 12800 Shaker Blvd., Cleveland 20, Ohio.

CEMENT (Metallic)

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Smooth-On Manufacturing Co., 570 Communipaw Ave., Jersey City 4, N. J.
Frederic B. Stevens, Inc., Detroit 16, Mich.

CEMENT (Refractory)

Bay State Abrasive Products Co., Westboro, Mass.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carborundum Co., Perth Amboy, N. J.
A. P. Green Fire Brick Co., Mexico, Missouri.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Ironton Fire Brick Co., Ironton, O.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Mexico Refractories, Mexico, Mo.
Mullite Refractories, Shelton, Conn.
North American Refractories Co., National City Bank Bldg., Cleveland 14, Ohio.
Norton Co., Worcester 6, Mass.

CHAIN (Hoist, Conveyor, Drive, Sling, etc.)

American Chain Div., American Chain & Cable Co. Inc., York, Pa.
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Great Western Mfg. Co., Leavenworth, Kansas.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus, O.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
S. G. Taylor Chain Co., Hammond, Ind.

CHAPLETS

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.
Fanner Mfg. Co., Brookside Park, Cleveland 2, Ohio.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O
Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee 4, Wis.
Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.

CHEMICALS

General Chemical Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Hercules Powder Co., Wilmington 99, Del.
Monsanto Chemical Co., Plastics Div., Springfield 2, Mass.
Olin Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.

CHEMISTS

Chas. C. Kawin Co., 431 S. Dearborn St., Chicago 5, Ill.

CHILLS

Alloy Metal Abrasive Co., 121 South Division St., Ann Arbor, Mich.
Fanner Mfg. Co., Brookside Park, Cleveland 2, Ohio.
Milwaukee Chaplet & Mfg. Co., 1023 So. 40th St., Milwaukee 4, Wis.
Standard Horse Nail Corp., New Brighton, Pa.

CHILL COATINGS

Acheson Colloids Co., Port Huron, Mich.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.

CHILL NAILS—See NAILS (chill)

CHIPPERS—See PNEUMATIC TOOLS

CHISELS (Chipping) —See PNEUMATIC TOOLS and CHISELS

CHROMIUM (Briquets)

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Whitehead Metal Products, 303 West 10th St., New York 6, N. Y.

CLAMPS (Flask)

Black Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 3, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Pressed Steel Div., Republic Steel Corp., 6100 Truscon Ave., Cleveland, Ohio.
Shanafelt Mfg. Co., Canton, Ohio.
Sterling Wheelbarrow Co., 1700 W. Walker St., Milwaukee 14, Wis.

CLAY (Bonding)

Baroid Division, 637 Railway Exchange Bldg., 80 East Jackson Blvd., Chicago 4, Ill.
Carpenter Brothers, Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.
Cedar Heights Clay Co., Oak Hill, Ohio.
Eastern Clay Products Dept. International Minerals & Chemical Corp., 20 N. Wacker Dr., Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Hooker Electrochemical Co., Buffalo Avenue & 47th St., Niagara Falls, N. Y.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.
North American Refractories Co., National City Bank Bldg., Cleveland 14, Ohio.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

CLAY (Refractory)—See REFRACTORIES

CLEANING—See BLAST CLEANING EQUIPMENT

CLEANING COMPOUNDS

E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

CLUTCHES (Magnetic)

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

COATINGS—See CORE and MOLD WASH

COKE (Oven)

Alabama By-products Corp., Post Office Box 354, Birmingham, Ala.
DeBardeleben Coal Corp., 2201 First Ave., N., Birmingham 3, Ala.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Pickands, Mather & Co., Cleveland 14, O.
Pittsburgh Coke & Chemical Co., Grant Building, Pittsburgh 19, Pa.
Republic Coal & Coke Co., 8 So. Michigan Ave., Chicago 3, Ill.
Semet Solvay Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.

COKE (Petroleum)

Great Lakes Carbon Corp., Hancock Bldg., Niagara Falls, N. Y.
Republic Coal and Coke Co., 8 S. Michigan Ave., Chicago 3, Ill.

CONVERTER BLOWERS—See BLOWERS

CONVERTERS (Bessemer)

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

CONVEYOR DESIGN

Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
Richardson Scale Co., 668 Van Houten Ave., Clifton, N. J.
Service Conveyor Co., 7764 Bryden Ave., Detroit 10, Mich.

CONVEYORS (Chain)

Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Richards-Wilcox Mfg. Co., 174 Third St., Aurora, Ill.
Service Conveyor Co., 7764 Bryden Ave., Detroit 10, Mich.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Fabric, Rubber) Belt)

Bartlett & Snow Co., C. O., 6... Harvard Ave., Cleveland 5, O.
Beardsley & Piper Div, Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
B. F. Goodrich Co., Akron, Ohio.
Great Western Mfg. Co., Leavenworth, Kansas.
Imperial Belting Co., 1800 So. Kilbourn Ave., Chicago 23, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Service Conveyor Co., 7764 Bryden Ave., Detroit 10, Mich.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Gravity Roller)

Alvey-Ferguson Co., 75 Disney St., Cincinnati 9, Ohio.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.

Service Conveyor Co., 7764 Bryden Ave., Detroit 10, Mich.
Standard Conveyor Co., North St. Paul 9, Minn.
Westover Engineers, 3110 W. Fond Du Lac Ave., Milwaukee 10, Wis.

CONVEYORS (Live Roller)

Alvey-Ferguson Co., 75 Disney St., Cincinnati 9, Ohio.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Service Conveyor Co., 7764 Bryden Ave., Detroit 10, Mich.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Magnetic)

Stearns Magnetic Inc., 635 South 28th St., Milwaukee 46, Wis.

CONVEYORS (Metal Belt)

May-Fran Engineering, Inc., 1710 Clarkstone Road, Cleveland 12, Ohio.

CONVEYORS (Mold)

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Service Conveyor Co., 7764 Bryden Ave., Detroit 10, Mich.

CONVEYORS (Overhead Monorail)

Alvey-Ferguson Co., 75 Disney St., Cincinnati 9, O.
American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 E. 283rd St., Wickliffe, O.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
Modern Equipment Co., Port Washington, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Penn Iron Works Inc., Reading, Pa.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Richards-Wilcox Mfg., 174 Third St., Aurora, Ill.
Whiting Corp., Harvey, Ill.

CONVEYORS (Pneumatic)

Fuller Company, Catasauqua, Pa.
Gerwin Industries, 214 Spring St., Michigan City, Ind.

CONVEYORS (Portable)

Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

CONVEYORS (Vibrating)

Ajax Flexible Coupling Co., Westfield, N. Y.
Carrier Conveyor Corp., Frankfort Ave. at Clifton, Louisville 6, Ky.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Simplicity Engineering Co., Durand, Mich.

COPPER

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

COPPER SHOT

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

CORE BINDERS

Acme Resin Corp., Forest Park, Ill.
American Gum Products Co., 500 Fifth Ave., New York 18, N. Y.
Archer-Daniels-Midland Co., Foundry Products Div., 2191 W. 110th St., Cleveland 2, O.
Bakelite Corp., 300 Madison Ave., New York 17, N. Y.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
The Borden Co., Thor Division, 350 Madison Ave., New York 17, N. Y.
Cities Service Oil Co., 20 N. Wacker Dr., Chicago 6, Ill.
Corn Products Refining Co., 17 Battery Pl., New York 4, N. Y.
Delta Oil Products Co., Milwaukee 9, Wis.
Durez Plastics & Chemicals Co., North Tonawanda, N. Y.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
General Electric Co., Chemical Materials Dept., 1 Plastics Ave., Pittsfield, Mass.
Foundry Rubber Inc., 6100 River Rd., Washington 16, D. C.
Goehringer Foundry Supply Co., 919 West Fifth St., Cincinnati 3, O.
Hercules Powder Co., Wilmington 99, Del.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Monsanto Chemical Co., Plastics Division, Springfield 2, Mass.
Penola Oil Co., 14300 McNichols Rd., West Detroit 35, Mich.
Reichhold Chemical Co., 525 North Broadway, White Plains, N. Y.
Robeson Process Co., 500 Fifth Ave., New York 18, N. Y.
Schenectady Resins, P.O. Box 1046, Schenectady, N. Y.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Fdereric B. Stevens, Inc., Detroit 16, Mich.
Superior Graphite Co., 33 S. Clark St., Chicago 3, Ill.
Swan-Finch Oil Corp., 285 Madison Ave., New York 17, N. Y.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
United Oil Co., Erie, Pa.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

CORE BLOWER BUSHINGS

Eastern Clay Products, Dept. International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.

CORE BLOWING MACHINES

Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Wm. Demmler & Bros. Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
International Molding Machine Co., LaGrange Park, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

COREBOXES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.

CORE COLORING

Eaton Chemical & Dyestuff Co., 1490 Franklin, Detroit, Mich.

CORE CUTOFF & CONING MACHINES

Wadsworth Equipment Co., 2477 Mogadore Rd., Akron, Ohio.

CORE DRAWING MACHINES

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE DRIERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Grindle Corp., 15405 Park Ave., Harvey, Ill.

CORE GRINDERS (Power Operated)

Jeffrey Mfg. Co., Columbus 16, O.
Milwaukee Foundry Equipment Div., Spo Inc., 3328 Pierce St., Milwaukee 4, Wis.
Sutter Products Co., Dearborn, Mich.

CORE KNOCKOUT MACHINES

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Beardsley & Piper Div. Pettibone-Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Pangborn Corp., Hagerstown, Md.
Simplicity Engineering Co., Durand, Mich.

COREMAKING MACHINES

Beardsley & Piper Div. Pettibone-Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Champion Div. Pettibone-Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange,Park, Ill.
Johnston & Jennings Div. Pettibone-Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Milwaukee Foundry Equipment Div., Spo Inc., 3328 Pierce St., Milwaukee 4, Wis.
Porbeck Mfg. Co., 2600 N. Ninth St., St. Louis 6, Mo.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.
Sutter Products Co., Dearborn, Mich.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Wadsworth Equipment Co., 2477 Mogadore Rd., Akron, Ohio.

CORE OILS—See CORE BINDERS

CORE and MOLD OVENS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, O.
Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Foundry Eqquipment Co., 1831 Columbus Rd., Cleveland 13, O.
Girdler Corp., Thermex Division, 224 E. Broadway, Louisville 2, Ky.
Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Michigan Oven Co., 419 Brainard St., Detroit 1, Mich.
Newcomb-Detroit Co., 5741 Russell St., Detroit 11, Mich.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.
J. O. Ross Engineering Corp., 444 Madison Ave., New York 17, N.Y.
Stroman Furnace & Engineering, Div. of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

CORE PASTE

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Corn Products Refining Co., 17 Battery Pl., New York 4, N. Y.
Delta Oil Products Co., Milwaukee 9, Wis.
Eastern Clay Products, Dept. International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.
Superior Graphite Co., 33 S. Clark St., Chicago 3, Ill.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

CORE PLATES (Steel, Aluminum, Magnesium, Asbestos)

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 6, Mo.
Christiansen Corp., 210 South Marion, Oak Park 1, Ill.
Champion Division, Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Johns-Manville, 22 E. 40th St., New York 16, N. Y.
Pressed Steel Div. Republic Steel Corp., 6100 Truscon Ave., Cleveland, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

CORE ROD STRAIGHTENING and CUTTING MACHINERY

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Kane & Roach, Niagara St., Syracuse 4, N. Y.

CORE SAND—See SAND

CORE SAND MIXERS—See SAND PREPARATION EQUIPMENT

CORE STRIPPERS—See CORE DRAWING MACHINES

CORE TRUCKS—See TRUCKS (Core)

CORE VENTS

Demmler, Wm., & Bros., Kewanee, Ill.
Smillie, C. M. & Co., 1124 Woodward Heights Blvd., Ferndale 20, Mich.

CORE and MOLD WASH

Acheson Colloids Co., Port Huron, Mich.
Asbury Graphite Mills, Inc., Asbury, N. J.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carborundum Co., Perth Amboy, N. J.
Cities Service Oil Co., 20 N. Wacker Dr., Chicago 6, Ill.
Corn Products Refining Co., 17 Battery Pl., New York City 4.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Services, Inc., 200 Bruck St., Columbus, Ohio.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Mullite Refractories, Shelton, Conn.
Pennsylvania Pulverizing Co., 140 Stanwix St., Pittsburgh 22, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.

Stevens, Frederic B., Inc., Detroit 26, Mich.
Superior Graphite Co., 33 S. Clark St., Chicago 3, Ill.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
Titanium Alloy Mfg. Div. National Lead Co., Hyde Park Blvd., Niagara Falls, N. Y.
United Oil Co., Erie, Pa.
United States Graphite Co., Saginaw, Mich.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

CORE WIRES

Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.

CORES (Strainer, Ceramic)

Louthan Corp., East Liverpool, Ohio.
Porcelain Products, Inc., Findlay, Ohio.
Universal Clay Products, Sandusky, Ohio.

COUPLINGS (Air Line)

Aeroquip Corp., Jackson, Mich.
Cleco Division of Reed Roller Bit Co., Houston, Tex.
A. Schrader's Son, 470 Vanderbilt Ave., Brooklyn 17, N. Y.

CRANES (Bucket)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Gantry)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Modern Equipment Co., Port Washington, Wis.
Northern Engineering Works, 2615 Atwater St., Detroit 7, Mich.

CRANES (Jib)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Industrial Crane & Hoist Corp., 1536 South Paulina St., Chicago 8, Ill.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Monorail—Electric and Hand)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Erie Strayer Co., Erie, Pa.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 14, Wis.
Industrial Crane & Hoist Corp., 1536 South Paulina St., Chicago 8, Ill.
Modern Equipment Co., Port Washington, Wis.
Northern Engineering Works, 2615 Atwater St., Detroit 7, Mich.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.
Wright Hoist Div., American Chain & Cable Co., Inc., York, Pa.

CRANES (Self-Propelled)

Baker Raulang Company, 1250 West 80th St., Cleveland 2, Ohio.
Silent Hoist & Crane Co., 835 63rd St., Brooklyn 20, N. Y.

CRUCIBLES

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Lava Crucible Co., Pittsburgh, Pa.
Ross-Tacony Crucible Co., Tacony, Philadelphia, Pa.
Vesuvius Crucible Co., Swissvale, Pa.

CRUCIBLE POURING DEVICES

Modern Equipment Co., Port Washington, Wis.

CRUSHERS (Core)

Newaygo Engineering Co., Newaygo, Mich.
Simplicity Engineering Co., Durand, Mich.

CUPOLAS

The Grindle Corp., 15405 Park Ave., Harvey, Ill.
Modern Equipment Co., Port Washington, Wis.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLAS (Hot Blast Equipment)

The Grindle Corp., 15405 Park Ave., Harvey, Ill.
J. O. Ross Engineering Corp., 444 Madison Ave., New York 17, N. Y.

CUPOLA BLOWERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Spencer Turbine Co., Hartford, Conn.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CHARGING MACHINES

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Columbiana Pump Co., Columbiana, Ohio.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 14, Wis.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CONTROL EQUIPMENT

Foxboro Company, Foxboro, Mass.

CUPOLA DUST ARRESTORS—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

CUPOLA LIGHTERS

The Grindle Corp., 15405 Park Ave., Harvey, Ill.
Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.
Hickman-Williams Co., Union Commerce Bldg., Cleveland 14, Ohio.
Whiting Corp., Harvey, Ill.

CUPOLA LININGS—See REFRACTORIES

CUPOLA PATCHING GUNS—See REFRACTORY GUNS

CUTOFF MACHINES (Abrasive)

Fox Grinders Inc., Oliver Bldg., Pittsburgh, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

CUTOFF WHEELS

Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Abrasives Corp., Vars Bldg., Buffalo 2, N. Y.
Macklin Company, Jackson, Mich.
Norton Company, Worcester 6, Mass.
Raybestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.
Sterling Abrasive Division, Cleveland Quarries Co., Tiffin, Ohio

CUTTING OILS

E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

CYLINDERS (Air)

Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill.
Miller Fluid Power Co., 2040 North Hawthorne, Melrose Park, Ill.

CYLINDERS (Hydraulic)

Miller Fluid Power Co., 2040 North Hawthorne, Melrose Park, Ill.

DARK ROOM ACCESSORIES—See X-RAY FILM and ACCESSORIES

DEGASIFIERS and DEOXIDIZERS

Carborundum Co., Perth Amboy, N. J.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Foundry Services, Inc., 2000 Bruck St., Columbus, Ohio.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

DESULPHURIZERS

Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Columbia-Southern Chemical Corp., Div., Pittsburgh Plate Glass Co., Pittsburgh 19, Pa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hercules Powder Co., Wilmington 99, Del.
Modern Equipment Co., Port Washington, Wis.
Olin Mathieson Chemical Corp., 60 Mathieson Bldg., Baltimore 3, Md.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
Solvay Process Division Allied Chemical & Dye Corp., 61 Broadway, New York 6, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DIE CASTING MACHINES

Kux Machine Co., 6725 North Ridge Ave., Chicago 26, Ill.
Lewis Welding & Engineering Co., Bedford, Ohio.

DOWEL PINS

Standard Horse Nail Corp., New Brighton, Pa.

DRILLS (Electric)

Delta Power Tool Div., Rockwell Mfg. Co., Pittsburgh 8, Pa.
Standard Electrical Tool Co., 2488 River Road, Cincinnati 4, Ohio.

DRILLS (Pneumatic)

Gardner-Denver Co., Quincy, Ill.
Schramm Inc., West Chester, Pa.

DRUMS (Magnetic)—See SEPARATORS (Magnetic)

DUMP HOPPERS

Brummeler Steel Products Co., Grand Rapids 7, Mich.
Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

DUMP TRUCKS

Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.
Kwik-Mix Co., 3026 West Concordia, Milwaukee 16, Wis.

Prime Mover Co., Muscatine, Iowa.
Tractomotive Corp., Deerfield, Ill.

DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

American Air Filter Co., Inc., 266 Central Ave., Louisville 8, Ky.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Dust Collector Corp., 600 Machinery Hall Bldg., Chicago 6, Ill.
Dust Suppression & Engineering Co., Lake Orein, Michigan.
The Grindle Corp., 15405 Park Ave., Harvey, Ill.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.
Macleod Co., P. O. Box 452, Sharonsville, Ohio.
Martin Equipment Co., P.O. Box 173, Wabash, Ind.
Newcomb-Detroit Co., 5741 Russell St., Detroit 11, Mich.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., 4590 Beidler Rd., Willoughby, Ohio.
J. O. Ross Engineering Corp., 444 Madison Ave., New York 17, N. Y.
Schneible Co., Claude B., 212 Stephenson Bldg., P.O. Box 81, North End Station, Detroit 2, Mich.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Standard Electrical Tool Co., 2488 River Road, Cincinnati 4, Ohio.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DUST CONTROL AGENTS

Parsons Engineering Corp., 4590 Beidler Rd., Willoughby, Ohio.

DYES & CHEMICALS

Eaton Chemical & Dyestuff Co., 1490 Franklin, Detroit, Mich.

ELECTRIC FURNACES (See Furnaces, Electric)

ELECTRODES (Graphite and Amorphous)

Great Lakes Carbon Corp., Hancock Bldg., Niagara Falls, N. Y.

ELEVATORS (Bucket)

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Great Western Mfg. Co., Leavenworth, Kansas.
Jeffrey Mfg. Co., Columbus 16, O.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

ELEVATORS (Pneumatic, Material Handling)

Fuller Co., Catasauqua, Pa.

ENGINEERING SERVICE (Foundry)

Edwin S. Carman, 1643 Lee Road, Cleveland 18, Ohio.
Giffels & Vallet, Inc. Marquette Bldg., Detroit, Mich.

Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.
Westover Engineers, 3110 W. Fond du Lac Avenue, Milwaukee 10, Wis.

EXHAUST—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

FABRICATORS (Metal)

Newaygo Engineering Co., Newaygo, Mich.
Penn Iron Works, Inc., Reading, Pa.
Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

FACINGS

Acheson Colloids Co., Port Huron, Mich.
Asbury Graphite Mills, Inc., Asbury, N. J.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Stevens Inc., Frederic B., Detroit 16, Mich.
Superior Graphite Co., 33 S. Clark St., Chicago 3, Ill.
United States Graphite Co., Saginaw, Mich.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

FANS—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

FASTENERS (Conveyor Belt)

Flexible Steel Lacing Co., 4667 Lexington St., Chicago 44, Illinois.

FEEDERS (Belt)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Link-Belt Company, 307 North Michigan Ave., Chicago 1, Ill.
Robins Conveyors, Div. Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

FEEDERS (Rotary)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Fuller Company, Catasauqua, Pa.
Great Western Mfg. Co., Leavenworth, Kansas.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
Newaygo Engineering Co., Newaygo, Mich.

FEEDERS (Vibrating)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link-Belt Company, 307 North Michigan Ave., Chicago 1, Ill.
Robins Conveyors, Div. Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

FERROBORON

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Molybdenum Corp. of America, Pittsburgh 19, Pa.

FERROCHROME

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Hickman-Williams & Co., Cleveland, O.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROCOLUMBIUM

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

FERROMANGANESE

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

FERROMOLYBDENUM

Molybdenum Corporation of America, Pittsburgh 19, Pa.

FERROSILICON

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTITANIUM

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Titanium Alloy Mfg. Div. National Lead Co., Hyde Park Blvd., Niagara Falls, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTUNGSTEN

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Molybdenum Corp. of America, Pittsburgh 19, Pa.

FERROVANADIUM

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FILTERS (Air)

American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
Parsons Engineering Corp., 4590 Beidler Rd., Willoughby, Ohio.

FIRE BRICK, CLAY, SAND, STONE—See REFRACTORIES

FLASK BANDS—See BANDS (Snap Flask)

FLASK BUSHINGS, PINS and FITTINGS

The Adams Co., Dubuque, Iowa.
Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 6, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Pressed Steel Div., Republic Steel Corp., 6100 Truscon Ave., Cleveland, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Smillie & Co., C. M., 1124 Woodward Hgts. Blvd., Ferndale 20, Mich.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Universal Engineering Co., Frankenmuth, Mich.

FLASK FILLERS

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.
Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Jeffrey Mfg. Co., Columbus 16, O.

FLASK LIFT MACHINES—See PATTERN DRAW MACHINES

FLASKS (Aluminum, Magnesium)

Adams Co., Dubuque, Iowa.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

FLASKS (Slip)

Adams Co., Dubuque, Iowa
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

FLASKS (Snap)

Adams Co., Dubuque, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, Ohio.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Stevens, Inc., Frederic B., Detroit 16, Mich.

FLASKS (Steel)

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 6, Mo.
Pressed Steel Div., Republic Steel Corp., 6100 Truscon Ave., Cleveland, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

FLASKS (Wood)

Adams Co., Dubuque, Iowa.

FLEXIBLE COUPLINGS

Ajax Flexible Coupling Co., Westfield, N. Y.
Link Belt Company, 307 North Michigan Ave., Chicago 1, Ill.

FLOORING

Norton Co., Worcester 6, Mass.

FLUXES

Cleveland Flux Co., 1026 Main St., Cleveland 13, Ohio.
Foundry Services, Inc., 2000 Bruck St., Columbus, Ohio.
General Chemical Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Olin Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

FLUXES (Soldering, Welding & Tinning)

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

FOUNDRY ENGINEERS (See ENGINEERING SERVICE)

FOUNDRY LAYOUT & METHODS (See ENGINEERING SERVICE)

FOUNDRY NAILS

Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.
Standard Horse Nail Corp., New Brighton, Pa.

FOUNDRY SUPPLY HOUSES

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Eastern Clay Products, Dept. International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Stevens, Inc., Frederic B., Detroit 16, Mich.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.

FURNACE BLOWERS—See BLOWERS

FURNACE LININGS—See REFRACTORIES

FURNACES (Air)

Grindle Corp., 16231 Turner Ave., Harvey, Ill.
Holcroft & Co., 6545 Epworth Blvd., Detroit 10, Mich.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACES, (Electric Melting)

Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
American Bridge Co., Div. United States Steel Corp., 525 Wm. Penn Place, Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Hevi Duty Electric Co., 4212 Highland Ave., Milwaukee 1, Wis.
Ohio Crankshaft Co., Tocco Division, 4620 E. 71st St., Cleveland 5, Ohio.
Pittsburgh Lectromelt Furnace Corp., P.O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler, Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Gas or Oil Fired Melting)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Campbell-Hausfeld Co., Harrison, O.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Electric Furnace Co., West Wilson St., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lanly Company, 750 Prospect Ave., Cleveland 15, Ohio.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Reda Pump Co., Bartlesville, Okla.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

FURNACES (Heat Treating and Annealing)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Ajax Electrothermic Corp., Trenton, N. J.
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Electric Furnace Co., West Wilson St., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
General Electric Co., Schenectady, N. Y.
The Grindle Corp., 15405 Park Ave., Harvey, Ill.
Hevi Duty Electric Co., 4212 Highland Ave., Milwaukee 1, Wis.
Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lanly Company, 750 Prospect Ave., Cleveland 15, Ohio.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Ohio Crankshaft Co., Tocco Division, 4620 E. 71st St., Cleveland 5, Ohio.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

GAGGERS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Wadsworth Equipment Co., 2477 Mogadore Rd., Akron, Ohio.

GAS (Oxygen, Acetylene, Industrial)

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

GAS BURNERS—See BURNERS

GENERATORS (Acetylene)

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

GLOVES—See SAFETY CLOTHING

GOGGLES and EYE PROTECTORS

American Optical Co., Southbridge, Mass.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
Willson Products Inc., Reading, Pa.

GRAPHITE and GRAPHITE BRIQUETS

Acheson Colloids Co., Port Huron, Mich.
Asbury Graphite Mills Inc., Asbury, N. J.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Great Lakes Carbon Corp., Hancock Bldg., Niagara Falls, N. Y.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Superior Graphite Co., 33 S. Clark St., Chicago 3, Ill.
United States Graphite Co., Saginaw, Mich.

GRINDERS (Electric Portable)

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Chicago Wheel & Mfg. Co., 1101 W. Monroe, Chicago 7, Ill.
Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 23, Ohio.
Standard Electrical Tool Co., 2488 River Road, Cincinnati 4, Ohio.

GRINDERS (Flexible Shaft)

Chicago Wheel & Mfg. Co., 1101 W. Monroe, Chicago 7, Ill.

GRINDERS (Pneumatic Portable)

Aro Equipment Corp., Bryan, Ohio.
Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Tex.
Master Pneumatic Tool Co., Inc., Orwell, Ohio.
Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 23, Ohio.

GRINDERS (Surface, Bench, Disc, Floor)

Chicago Wheel & Mfg. Co., 1101 W. Monroe, Chicago 7, Ill.
Fox Grinders Inc., Oliver Bldg., Pittsburgh 22, Pa.
Standard Electrical Tool Co., 2488 River Road, Cincinnati 4, Ohio.

GRINDERS (Swing Frame)

Fox Grinders, Inc., Oliver Bldg., Pittsburgh 22, Pa.
Sutter Products Co., Dearborn, Mich.

GRINDING WHEELS

Bay State Abrasive Products Co., Westboro, Mass.
Bradford Machine Tool Co., 657 Evans St., Cincinnati 4, Ohio.
Carborundum Co., Niagara Falls, N. Y.
Chicago Wheel & Mfg. Co., 1101 W. Monroe, Chicago 7, Ill.
Cincinnati Milling Machine Co., Cincinnati 9, Ohio
Colonial Abrasive Products Co., Conshohocken, Pa.
Elgin National Watch Co., 107 National Ave., Elgin, Ill.
Macklin Company, Jackson, Mich.
Mid West Abrasive Co., Owosso, Michigan.
Norton Company, Worcester 6, Mass.
Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit, Mich.
Raybestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.
United States Rubber Co., 4300 New Haven Ave., Fort Wayne 4, Ind.

GRINDING WHEEL DRESSERS

Carborundum Co., Niagara Falls, N. Y.
Chicago Wheel & Mfg. Co., 1101 W. Monroe, Chicago 7, Ill.
Desmond-Stephen Mfg. Co., Urbana, O.

GRINDSTONES—See GRINDING WHEELS

GRIT—See SHOT and GRIT

HAMMERS (Chipping)—See PNEUMATIC TOOLS and CHISELS

HARDNESS TESTING EQUIPMENT

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

HEAT CONTROL AND RECORDING DEVICES

Claude S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
The Grindle Corp., 15405 Park Ave., Harvey, Ill.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.

HEATERS (Space, Unit, Oven, Water)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Drying Systems Inc., 1800 W. Foster Ave., Chicago 40, Ill.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
Newcomb-Detroit Co., 5741 Russell St., Detroit 11, Mich.
Thermal Research & Engineering Corp., Conshohocken, Pa.

HEATERS (High Frequency Electric)

Ajax Electrothermic Corp., Trenton, N. J.

HELMETS (Blasting)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
American Optical Co., Southbridge, Mass.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

HELMETS (Welding)

American Optical Co., Southbridge, Mass.

HOISTS (Air)

Aro Equipment Corp., Bryan, Ohio.
Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Curtis Pneumatic Machinery Div. Curtis Mfg. Co., 1905 Kienlen Ave., St. Louis 20, Mo.
Gardner-Denver Co., Quincy, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Miller Fluid Power Co., 2040 North Hawthorne, Melrose Park, Ill.

HOISTS (Chain, Hand)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Manning, Maxwell & Moore, Inc., Muskegon, Mich.
Wright Hoist Div., American Chain & Cable Co., Inc., York, Pa.

HOISTS (Electric)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 14, Wis.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Manning, Maxwell & Moore, Inc., Muskegon, Mich.
Modern Equipment Co., Port Washington, Wis.
Northern Engineering Works, 2615 Atwater St., Detroit 7, Mich.
Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.
Wright Hoist Div., American Chain & Cable Co., Inc., York, Pa.

HOISTS (Skip)

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Gardner-Denver Co., Quincy, Ill.
Link Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

HOODS (Shakeout, Pouring & Cooling)—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

HOSE (Air, Blasting, Water, Gas)

Gardner-Denver Co., Quincy, Ill.
B. F. Goodrich Co., Akron, Ohio.
Hewitt Rubber Div., Hewitt-Robins Div., Inc., 240 Kensington Ave., Buffalo 5, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Pangborn Corp., Hagerstown, Md.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.
Schramm Inc., West Chester, Pa.

HOSE FITTINGS and REELS

Aeroquip Corp., Jackson, Mich.
A. Schrader's Son, 417 Vanderbilt Ave., Brooklyn 17, N. Y.

HYDRAULIC CLEANING—See BLAST CLEANING EQUIPMENT

IMPREGNATING SYSTEMS and CASTING SEALER

Tousey Varnish Co., 520 West 25th St., Chicago 16, Ill.
Western Sealant Co., 999 West Jefferson Blvd., Culver City, Calif.

INGOT MOLDS

Acme Foundry Co., Detroit 16, Mich.
Great Lakes Carbon Corp., Hancock Bldg., Niagara Falls, N. Y.

INGOTS—(See type of metal)

INOCULANTS

Carborundum Co., Perth Amboy, N. J.
United States Graphite Co., Saginaw, Mich.

IRON CEMENT

Smooth-On Mfg. Co., 570 Communipaw Ave., Jersey City 4, N. J.

IRON ORE

Pickands, Mather & Co., Cleveland 14, O.

IRON OXIDES

Delta Oil Products Co., Milwaukee 9, Wis.
Tamms Industries Inc., 228 No. La Salle St., Chicago 1, Ill.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.

JACKETS (Mold)—See MOLD JACKETS

LABORATORY EQUIPMENT (Chemical)

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Great Western Mfg. Co., Leavenworth, Kansas.

LABORATORY EQUIPMENT (Physical)

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
W. C. Dillon & Co., Inc., 14620 Keswick St., Van Nuys, Calif.
Claude S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
Great Western Mfg. Co., Leavenworth, Kansas.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Norton Co., Worcester 6, Mass.

LADLES

Grindle Corp., 16231 Turner Ave., Harvey, Ill.
Industrial Equipment Co., Minster, O.
Modern Equipment Co., Port Washington, Wis.
Spincraft Inc., 4122 W. State St., Milwaukee 8, Wis.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

LADLE LININGS—See REFRACTORIES

LEAD

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.
George Sall Metals Co., 2300 East Butler St., Philadelphia 37, Pa.

LIFT TRUCKS (See Trucks, Power Lift)

LINSEED OIL

Hercules Powder Co., Wilmington 99, Del.
United Oil Co., Erie, Pa.

LITHIUM

Lithium Corp. of America, Rand Tower, Minneapolis, Minn.

LOADERS

Clearfield Machine Co., Clearfield, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

LOADERS (Front-End)

Baker Raulang Co., 1250 West 80th St., Cleveland 2, Ohio.
Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.

LUBRICATING SYSTEMS (Crane)

Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.

LUBRICANTS (Industrial)

Acheson Colloids Co., Port Huron, Mich.
Penola Oil Co., 14300 McNichols Rd., West, Detroit 35, Mich.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Swan-Finch Oil Corp., 285 Madison Ave., New York 17, N. Y.
United Oil Mfg. Co., Erie, Pa.
United States Graphite Co., Saginaw, Mich.

MACHINE KEYS

Standard Horse Nail Corp., New Brighton, Pa.

MAGNESIUM INGOTS

Christiansen Corp., 210 South Marion, Oak Park 1, Ill.
Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

MAGNET CONTROLLERS

Ohio Electric Mfg. Co., 5400 Dunham Rd., Maple Heights, Ohio.

MAGNETS

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Jaeger Machine Co., Columbus 16, Ohio.
Ohio Electric Mfg. Co., 5400 Dunham Rd., Maple Heights, Ohio.
Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

MANGANESE (Briquets)

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro-Alloys Corp., Canton 2, Ohio.
Whitehead Metal Products 303 West 10th St., New York 6, N. Y.

MATCHPLATE METAL

Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.

MATCHPLATES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Champion Div. Pettibone Mulliken Corp. 2424 N. Cicero, Chicago 39, Ill.
City Pattern Foundry & Machine Co., 1165 Harper, Detroit 11, Mich.
Hines Flask Co., 3431 W. 140 St., Cleveland 11, Ohio
Scientific Cast Products Corp., 1388-92 E. 40 St., Cleveland 3, O.

MELTING POTS

Acme Foundry Co., Detroit 16, Mich.

METAL CLEANING—See BLAST CLEANING EQUIPMENT

METALLOGRAPHIC EQUIPMENT

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

METALLURGICAL CHEMISTS

Chas. C. Kawin Co., 431 S. Dearborn St., Chicago 5, Ill.

METERS (Gas, Air, Water)

Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.

MIXERS (Core Wash)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

MIXERS (Sand and Clay)—See SAND PREPARATION EQUIPMENT

MOLD CONVEYORS — See CONVEYORS (Mold)

MOLD DRYERS

Burdett Mfg. Co., 3433 W. Madison, Chicago 7, Ill.
Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.
Edwin L. Wiegand Co., 7500 Thomas Blvd., Pittsburgh 8, Pa.
Porbeck Mfg. Co., 2600 N. 9th St., St. Louis 6, Mo.

MOLD JACKETS

Adams Co., Dubuque, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

MOLD OVENS—See Core and MOLD OVENS

MOLD SEAL COMPOUND

Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

MOLD WASH—See CORE and MOLD WASH

MOLDING MACHINES

Adams Co., Dubuque, Iowa.
Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Johnston & Jennings Div., Pettibone-Mulliken Corp., 2424 No. Cicero Ave., Chicago 39, Ill.
Milwaukee Foundry Equipment Div., Spo Inc., 3328 W. Pierce St., Milwaukee 4, Wis.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Shalco Engineering Corp., Palo Alto, Calif.
Sutter Products Co., Dearborn, Mich.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

MOLDING SANDS—See SAND

MOLYBDENUM

Molybdenum Corporation of America, Pittsburgh 19, Pa.

MONORAIL SYSTEMS—See CONVEYORS (Overhead Monorail)

MOTORS (Electric)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Ohio Electric Mfg. Co., 5400 Dunham Rd., Maple Heights, Ohio.

MULLERS—See SAND PREPARATION EQUIPMENT

NAILS (Chill)

Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.
Republic Steel Corp., 3100 E. 45th St., Cleveland 4, Ohio.
Standard Horse Nail Corp., New Brighton, Pa.

NICKEL

International Nickel Co., Inc., 67 Wall St., New York City 5.
Whitehead Metal Products 303 West 10th St., New York 6, N. Y.

NITROGEN—See GAS

NONDESTRUCTIVE TESTING

Magnaflux Corp., 7300 West Lawrence Ave., Chicago 31, Ill.

NOZZLES (Blasting)

Alloy Metal Abrasives Co., 121 South Division St., Ann Arbor, Mich.
American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Carborundum Co., Perth Amboy, N. J.
Davenport Machine & Foundry Co., Davenport, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Norton Co., Worcester 6, Mass.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

OIL BURNERS—See BURNERS

OPEN HEARTH DOORS

Wm. M. Bailey Co., Pittsburgh 16, Pa.

OPTICAL PYROMETERS—See PYROMETERS

OVENS (Annealing and Heat Treating)—See FURNACES (Heat Treating and Annealing)

OVENS (Core) (See CORE and MOLD OVENS)

OVENS (Enameling, Japanning)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
Michigan Oven Co., 419 Brainard, Detroit 1, Mich.
Porbeck Mfg. Co., 2600 N. 9th St., St. Louis 6, Mo.

OVENS (Mold Drying)—See CORE and MOLD OVENS

OXYGEN—See GAS

PARTING COMPOUNDS

Acheson Colloids Co., Port Huron, Mich.
Delta Oil Products Co., Milwaukee 9, Wis.
Dow Corning Corp., Midland, Mich.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Superior Graphite Co., 33 S. Clark St., Chicago 3, Ill.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.
Thien Products Co., 9800 West Rogers. Milwaukee 14, Wis.
United Oil Co., Erie, Pa.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

PATTERN COATINGS

Acheson Colloids Co., Port Huron, Mich.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Foundry Rubber Inc., 6100 River Rd., Washington 16, D. C.

PATTERN COMPOUND

Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

PATTERN DRAW MACHINES

The Adams Co., Dubuque, Iowa.
Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Div., Spo Inc., 3238 W. Pierce St., Milwaukee 4, Wis.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

PATTERN LUMBER

Rietz Lumber Co., 1814 N. Central Park Ave., Chicago 47, Ill.

PATTERN METAL

Cerro de Pasco Copper Co., 40 Wall St., New York, N. Y.
Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.

PATTERN PLATES—See PATTERNS and PATTERN PLATES (Wood, Metal)

PATTERN SHOP EQUIPMENT

Chicago Wheel & Mfg. Co., 1101 W. Monroe Chicago 7, Ill.
Oliver Machinery Company, Grand Rapids 2, Mich.

PATTERNS and PATTERN PLATES (Wood, Metal)

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Anderson Pattern Inc., Muskegon Heights, Mich.
Automotive Pattern Co., 1884 John R. Street, Detroit 3, Michigan.
Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
City Pattern Foundry & Machine Co., 1165 Harper, Detroit 11, Mich.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Master Pattern Co., 1315 Main Ave., Cleveland, O.
S.P.O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.
Wellman Bronze & Aluminum Co., 12800 Shaker Blvd., Cleveland 20, Ohio.

PERMANENT MOLDS

Centrifugal Casting Machine Co., Tulsa, Okla.
Great Lakes Carbon Corp., Hancock Bldg., Niagara Falls, N. Y.
Master Pattern Co., 1315 Main Ave., Cleveland, O.

PHOSPHOR COPPER

Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.

PHOTOGRAPHIC EQUIPMENT

Eastman Kodak Co., Rochester, N. Y.

PIG CASTING MACHINES

Wm. M. Bailey Co., Pittsburgh 16, Pa.

PIG IRON

Hanna Furnace Co., Ecorse, Detroit 29, Mich.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Pickands, Mather & Co., Cleveland 14, O.
Pittsburgh Coke & Chemical Co., Grant Building, Pittsburgh 19, Pa.
Republic Steel Corp., 3100 E. 45th St., Cleveland 4, Ohio.
Woodward Iron Co., Woodward, Ala.

PIG IRON (Silvery)

Hanna Furnace Co., Ecorse, Detroit 29, Mich.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.

PINS (Flask)—See FLASK BUSHINGS, PINS and FITTINGS

PISTON RINGS (for Molding Machines, Compressors, etc.)

Nicholls, Wm. H. Co., Richmond Hill, Long Island 18, N. Y.

PITCH

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

PLUMBAGO—See GRAPHITE and GRAPHITE BRIQUETS

PNEUMATIC TOOLS and CHISELS

Aro Equipment Corp., Bryan, Ohio.
Chambersburg Engineering Co., Chambersburg, Pa.
Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.
Dayton Pneumatic Tool Co., Dayton 1, Ohio.
Gardner-Denver Co., Quincy, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Master Pneumatic Tool Co., Inc., Orwell, Ohio.
Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 23, Ohio.
Schramm Inc., West Chester, Pa.

POURING DEVICES

Industrial Equipment Co., Minster, Ohio.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

PRESSER BOARDS

Adams Co., Dubuque, Iowa.
Christiansen Corp., 210 South Marion, Oak Park 1, Ill.

PRESSURE RECORDERS

Foxboro Company, Foxboro, Mass.

PULLEYS (Magnetic)—See SEPARATORS (Magnetic)

PUMPS

Gardner-Denver Co., Quincy, Ill.

PUMPS (Dry, Vacuum)

Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
Fuller Company, Catasauqua, Pa.

PUSHERS

Air Compressors & Motors, Inc., 3501 Croton Ave., Cleveland 6, Ohio.

PUSH-OFF MACHINES—See PATTERN DRAW MACHINES

PUTTY (Foundry)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

PYROMETERS

Foxboro Company, Foxboro, Mass.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Claude S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.
Pyrometer Instrument Co., Bergenfield, N. J.

RACKS (Core Ovens)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.

RADIOGRAPHY (Industrial)

Eastman Kodak Co., Rochester, N. Y.
Tracerlab, Inc., 130 High Street, Boston 10, Mass.

REFRACTORIES (Firebrick, Fire Clay, Fire Sand, Fire Stone)

Babcock & Wilcox Co., 161 42nd St., New York 17, N. Y.
Basic Refractories, Inc., 845 Hanna Bldg., Cleveland 15, Ohio.
Botfield Refractories, 786 S. Swanson St., Philadelphia 47, Pa.
Campbell-Hausfeld Co., Harrison, O.
Carborundum Co., Niagara Falls, N. Y.
Carborundum Co., Perth Amboy, N. J.
Carpenter Brothers Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.
Cedar Heights Clay Co., Oak Hill, Ohio.
Durex Refractories Co., P.O. Box 147, Jackson, O.
Eastern Clay Products Dept., International Minerals & Chemical Corp., 20 N. Wacker Dr., Chicago 6, Ill.
Great Lakes Carbon Corp., Hancock Bldg., Niagara Falls, N. Y.
A. P. Green Fire Brick Co., Mexico, Missouri.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.
Johns-Manville, 22 East 40th St., New York 16, N. Y.
Laclede Christy Div., H. K. Porter Co. Inc., 2000 Hampton Ave., St. Louis 10, Mo.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Mexico Refractories Co., Mexico, Mo.
Mullite Refractories, Shelton, Conn.
National Foundry Sand Co., 2970 W. Grand Blvd., Detroit 2, Mich.
North American Refractories Co., National City Bank Bldg., Cleveland 14, Ohio.
Norton Co., Worcester 6, Mass.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.
Titanium Alloy Mfg. Div., National Lead Co., Hyde Park Blvd., Niagara Falls, N. Y.
United States Graphite Co., Saginaw, Mich.
Walsh Refractories, 101 Ferry St., St. Louis 7, Mo.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

REFRACTORY GUNS

Air Compressors & Motors, Inc., 3501 Croton Ave., Cleveland 6, Ohio.
Basic Refractories, Inc., 845 Hanna Bldg., Cleveland 15, Ohio.
Durex Refractories Co., P.O. Box 147, Jackson, Ohio.
Eastern Clay Products Dept., International Minerals & Chemicals Corp., 20 N. Wacker Drive, Chicago 6, Ill.

RESIN (Shell Mold)

Acme Resin Corp., Forest Park, Ill.
Bakelite Corp., 300 Madison Ave., New York 17, N. Y.
The Borden Co., Thor Division, 350 Madison Ave., New York 17, N. Y.
Durez Plastics & Chemicals Inc., North Tonawanda, N. Y.
General Electric Co., Chemical Materials Dept., 1 Plastics Ave., Pittsfield, Mass.
Hercules Powder Co., Wilmington 99, Del.
Monsanto Chemical Co., Plastics Div., Springfield 2, Mass.
Plastics Engineering Co., 1607 Geele, Sheboygan, Wis.
Reichhold Chemical Co., 525 North Broadway, White Plains, N. Y.
Schenectady Resins, P. O. Box 1046, Schenectady, New York.

RESPIRATORS

Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
Willson Products Inc., Reading, Pa.

RIDDLES (Electric)

Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Great Western Mfg. Co., Leavenworth, Kans.

RIDDLES (Hand)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Great Western Mfg. Co., Leavenworth, Kansas.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

RISER COMPOUNDS

Asbury Graphite Mills, Inc., Asbury, N. J.
Foundry Services, Inc., 2000 Bruck St., Columbus, Ohio.

ROD STRAIGHTENERS—See CORE ROD STRAIGHTENING and CUTTING MACHINERY

ROLLER-HEARTH FURNACES — See FURNACES (Heat Treating and Annealing)

RUBBER LINING MATERIAL (Abrasive Resisting)

B. F. Goodrich Co., Akron, Ohio.
Pangborn Corp., Hagerstown, Md.

SAFETY CLOTHING

American Optical Co., Southbridge, Mass.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
Industrial Gloves Co., Danville, Ill.
Pulmosan Safety Equipment Co., 649 Pacific St., Brooklyn 17, N.Y.
Pangborn Corp., Hagerstown, Md.
United States Rubber Co., 4300 New Haven Ave., Ft. Wayne 4, Ind.

SALT and SALT TABLETS

U. S. Safety Service Co., 1331 Oak St., Kansas City 6, Mo.

SAND (Core, Molding, Blasting)

Carpenter Brothers, Inc., 606 West Wisconsin, Milwaukee 3, Wis.
Clayton Silica Co., Lafayette Bldg., Waterloo, Iowa.
Great Lakes Foundry Sand Co., United Artists Bldg., Detroit 26, Mich.
Lyle T. Manley Co., Rockton, Ill.
Nugent Sand Co., Muskegon, Mich.
Orefraction Inc., 7425 Thomas St., Pittsburgh 8, Pa.
Ottawa Silica Co., Ottawa, Ill.
Pangborn Corp., Hagerstown, Md.
Pennsylvania Glass Sand Corp., 140 Stanwix St., Pittsburgh 22, Pa.

Titanium Alloy Mfg. Div., National Lead Co., Hyde Park Blvd., Niagara Falls, N. Y.
Wedron Silica Co., 135 S. LaSalle St., Chicago 3, Ill.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

SAND BLAST BARRELS—See BLAST CLEANING EQUIPMENT

SAND BLAST EQUIPMENT—See BLAST CLEANING EQUIPMENT

SAND BLAST NOZZLES—See NOZZLES (Blasting)

SAND BLAST ROOMS—See BLAST CLEANING EQUIPMENT

SAND BLAST TABLES—See BLAST CLEANING EQUIPMENT

SAND CONTROL & TESTING EQUIPMENT

Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Claude S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
Great Western Mfg. Co., Leavenworth, Kansas.
Hayleo Controls Corp., Neenah, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

SAND DRYERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, Ohio.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
Nichols Engineering & Research Corp., 70 Pine St., New York 5, N. Y.

SANDING MACHINERY (Disc, Spindle, Belt, etc.)

Cleco Division of Reed Roller Bit Co., Houston, Texas.
Freeman Supply Co., 1152 E. Broadway, Toledo 5, Ohio.
Oliver Machinery Company, Grand Rapids 2, Mich.

SAND MEASURING and WEIGHING DEVICES

Baker Perkins Inc., Saginaw, Mich.
Link-Belt Co., 307 North Michigan Ave., Chicago 5, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Richardson Scale Co., 668 Van Houten Ave., Clifton, N. J.

SAND MIXERS—See SAND PREPARATION EQUIPMENT

SAND PREPARATION EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Air Filter Co., Louisville 8, Ky.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Baker Perkins Inc., Saginaw, Mich.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Blystone Division, Standard Sand & Machine Co., 549 W. Washington Blvd., Chicago 6, Ill.
Carrier Conveyor Corp., Frankfort Ave. at Clifton, Louisville 6, Ky.
Champion Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Clearfield Machine Co., Clearfield, Pa.

Deister Concentrator Co., 901 Glosgow Ave., Ft. Wayne, Ind.

Denver Equipment Co., 1400 171th St., Denver 17, Colo.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, Ohio.

Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.

B. F. Goodrich Co., Akron, Ohio.

Great Western Mfg. Co., Leavenworth, Kansas.

Jeffrey Mfg. Co., 907-99 N Fourth St., Columbus 16, O.

Link-Belt Company, 307 North Michigan Ave., Chicago 1, Ill.

Moulders Friend, Dallas City, Ill.

Muller Machinery Co., Metuchen 1, N. J.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Newaygo Engineering Co., Newaygo, Mich.

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

Pangborn Corp., Hagerstown, Md.

Pekay Machine & Engineering Co., 865 N. Sangamon St., Chicago 22, Ill.

Planet Corp., 1820 Sunset, Lansing 6, Mich.

Royer Foundry & Machine Co., Kingston, Pa.

Simplicity Engineering Co., Durand, Mich.

States Engineering Corp., 922 W. Berry, Ft. Wayne 2, Ind.

SAND RAMMERS

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.

Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.

Dayton Pneumatic Tool Co., Dayton 1, O.

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

Master Pneumatic Tool Co., Inc., Orwell, Ohio.

Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 23, Ohio.

SAND RECLAIMERS

Deister Concentrator Co., 901 Glasgow Ave., Ft. Wayne, Ind.

Denver Equipment Co., 1400 17th St., Denver 17, Colo.

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.

Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Newaygo Engineering Co., Newaygo, Mich.

Nichols Engineering & Research Corp., 70 Pine St., New York 5, N. Y.

Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

SAND SIFTING and SCREENING MACHINERY—See SAND PREPARATION EQUIPMENT

SAND STORAGE BINS & GATES

American Bridge Div. United States Steel Corp., 525 Wm. Penn Place, Pittsburgh 19, Pa.

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.

Gerotor May Corp., Maryland Avenue & Oliver, Baltimore, Md.

Jeffrey Mfg. Co., Columbus 16, O.

Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.

Marietta Concrete Corp., Marietta, Ohio.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Neff & Fry Co., Camden, Ohio.

Newaygo Engineering Co., Newaygo, Mich.

Planet Corp., 1820 Sunset, Lansing 6, Mich.

SAWS (Band, Metal, Wood)

American Saw & Mfg. Co., Springfield, Mass.

Delta Power Tool Div., Rockwell Mfg. Co., Pittsburgh 8, Pa.

Oliver Machinery Company, Grand Rapids 2, Mich.

Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

SCALING HAMMERS—See PNEUMATIC TOOLS and CHISELS

SCALES

Toledo Scale Co., Toledo 1, Ohio

SCREENS (Shakeout and Vibrating)

Ajax Flexible Coupling Co., Westfield, N. Y.

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.

Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.

Carrier Conveyor Corp., Frankfort Ave. at Clifton, Louisville 6, Ky.

Deister Concentrator Co., 901 Glasgow Ave., Ft. Wayne, Ind.

Great Western Mfg. Co., Leavenworth, Kansas.

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.

Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

Simplicity Engineering Co., Durand, Mich.

SEA COAL

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Frederic B. Stevens, Inc., Detroit 16, Mich.

Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

SEPARATORS (Air, Moisture, Oil)

American Air Filter Co., Louisville 8, Ky.

American Wheelabrator & Equipment Co., Mishawaka, Ind.

Jas. A. Murphy & Co., Hamilton, O.

Pangborn Corp., Hagerstown, Md.

A. Schrader's Son, 470 Vanderbilt Ave., Brooklyn 17, N. Y.

SEPARATORS (Magnetic)

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

SHAKE-OUT MACHINERY

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

American Air Filter Co., Louisville 8, Ky.

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

Link-Belt Co., 307 N. Michigan Ave., Chicago 9, Ill.

Planet Corp., 1820 Sunset, Lansing 6, Mich.

Robins Conveyors, Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

Royer Foundry & Machine Co., Kingston, Pa.

Simplicity Engineering Co., Durand, Mich.

SHELL MOLDING (Equipment & Accessories)

C & S Products Co., 14841 Meyers Rd., Detroit 27, Mich.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Shalco Engineering Corp., Palo Alto, Calif.

Shell Process Inc., McKinstry Ave., Chicopee, Mass.

Shell-O-Matic Corp., 26 Avenue L, Newark, N. J.

Sutter Products Co., Dearborn, Mich.

SHELL MOLD SAND (Coated)

Acme Resin Corp., Forest Park, Ill.

SHELL MOLDS—See RESIN

SHOT AND GRIT

Abrasive Shot and Grit Company, Springville, New York.

Alloy Metal Abrasive Co., 121 South Division St., Ann Arbor, Mich.

American Steel Abrasives Co., Galion, O.

American Wheelabrator & Equipment Co., Mishawaka, Ind.

Baldwin-Hill Co., 500 Breunig Ave., Trenton 2, N. J.

Carborundum Co., Niagara Falls, N. Y.

Carpenter Brothers, Inc., 606 West Wisconsin, Milwaukee 3, Wis.

Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio.

Globe Steel Abrasive Co., Mansfield, Ohio.

Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.

Metal Blast, Inc., 871 E. 67th St., Cleveland, Ohio.

National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.

Pangborn Corp., Hagerstown, Md.

Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.

W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

Steel Shot Producers, Inc., Butler, Pa.

SHOT (Peening)—See SHOT and GRIT

SHOVELS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Frederic B. Stevens, Inc., Detroit 16, Mich.

SHOVELS (Power)

Allen Industrial Products, 97 Liberty St., Battle Creek, Mich.

Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.

Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.

SILICA FLOUR

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, O.

Ottawa Silica Co., Ottawa, Ill.

Pennsylvania Pulverizing Co., 140 Stanwix St., Pittsburgh 22, Pa.

Wedron Silica Co., 135 S. LaSalle St., Chicago 3, Ill.

SILICOMANGANESE

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

SILICON (Briquets)

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

Whitehead Metal Products, 303 West 10th St., New York 14, N. Y.

SILICON CARBIDE (Briquets)

Carborundum Co., Perth Amboy, N. J.

SILVERY PIG IRON—See PIG IRON (Silvery)

SLINGS (Chain)—See CHAIN

SLINGS (Wire Rope)

Union Wire Rope Co., 21st & Manchester Ave., Kansas City, Mo.

SLIP FLASKS—See FLASKS, SLIP

SLIP JACKETS—See MOLD JACKETS

SMELTERS & REFINERS

Christiansen Corp., 210 South Marion, Oak Park 1, Ill.

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.

SNAGGING MACHINES—See GRINDERS

SNAGGING WHEELS—See GRINDING WHEELS

SNAP FLASKS—See FLASKS (Snap)

SODA ASH

Columbia-Southern Chemical Corp., Div., Pittsburgh Plate Glass Co., Pittsburgh 19, Pa.

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.

Hercules Powder Co., Wilmington 99, Del.

Olin Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.

Solvay Process Division, Allied Chemical & Dye Corp., 61 Broadway, New York 6, N. Y.

SOLDER

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.

SPECTROGRAPHIC ANALYSIS

Baird Associates, 33 University Rd., Cambridge 38, Mass.

Chas. C. Kawin Co., 431 South Dearborn St., Chicago 5, Ill.

SPRAY GUNS

Murphy & Co., Jas. A., Hamilton, O.

SPRUE CUTTERS

Adams Co., Dubuque, Iowa.

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.

Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee, Wis.
Rice Pump & Machine Co., Belgium, Wis.

STEEL SHOT—See SHOT and GRIT

STEEL (Structural)

American Bridge Co., Div. United States Steel Corp., 52 S. Wm. Penn Place, Pittsburgh 19, Pa.

STRAINER CORES—See CORES (Strainer, Ceramic)

STRIPPING MACHINES—See PATTERN DRAW MACHINES

TANK TRAPS

Jas. A. Murphy & Co., Hamilton, Ohio.

TANKS (Dewatering)

Claude B. Schneible Co., 212 Stephenson Bldg., P. O. Box 81, North End Station, Detroit 2, Mich.

TELLURIUM

American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.

TEMPERATURE CONTROLLERS

Foxboro Company, Foxboro, Mass.
Illinois Testing Laboratories, Inc., 418 LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.

TENSILE TESTING MACHINES

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.

TESTING EQUIPMENT—See Type of Test

THERMOCOUPLES

Claude S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.
Pyrometer Instrument Co., Bergenfield, N. J.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

TIMERS (Electric)

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

TIN

Federated Metals Div., American Smelting and Refining Co., 120 Boadway, New York 5, N. Y.

TONGS

Industrial Equipment Co., Minster, O.

TORCHES and BURNERS (Acetylene, Gas, Oil)

Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17.

TORCHES (Gouging & Cutting)—See WELDING, CUTTING and GOUGING APPARATUS

TOTE BOXES—See BOXES (Stacking, Tote)

TRACTOR—See TRUCKS (Utility and Power Lift)

TRAMRAIL SYSTEMS—See CONVEYORS (Overhead Monorail)

TROLLEYS

Curtis Pneumatic Machinery Div. Curtis Mfg. Co., 1905 Kienlen Ave., St. Louis 20, Mo.
Link-Belt Company, 307 North Michigan Ave., Chicago 1, Ill.
Modern Equipment Co., Port Washington, Wis.

TRUCK CRANES

Silent Hoist & Crane Co., 885 63rd St., Brooklyn 20, N. Y.

TRUCK WHEELS

Colson Corp., Elyria, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

TRUCKS (Core)

Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.
Prime Mover Co., Muscatine, Iowa.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

TRUCKS (Utility and Power Lift)

Baker-Raulang Co., 1250 West 80th St., Cleveland 2, Ohio.
Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.
Colson Corp., Elyria, Ohio.
Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.
Hyster Co., 2902 N.E. Clackamas St., Portland 8, Oregon.
Jaeger Machine Co., Columbus 16, Ohio.
Kwik-Mix Co., 3026 West Concordia, Milwaukee 16, Wis.
Prime Mover Co., Muscatine, Iowa.
Silent Hoist & Crane Co., 885 63rd St., Brooklyn 20, N. Y.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Tractomotive Corp., Deerfield, Ill.

TUMBLING BARRELS

Globe Stamping Co., Div. Hupp Corp., 1250 West 76th St., Cleveland 2, Ohio.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

TURNTABLES

Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Modern Equipment Co., Port Washington, Wis.
Newaygo Engineering Co., Newaygo, Mich.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

UNLOADERS (Car)

Link-Belt Company, 307 North Michigan Ave., Chicago 1, Ill.

VALVES (Air, Water, Steam)

Ross Operating Valve Co., 120 East Golden Gate, Detroit, Michigan.
Valvair Co., 454 Morgan Ave., Akron, Ohio.

VALVES (Blow-off and Cut-off)

Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Wm. H. Nicholls Co., Richmond Mill, Long Island 18, N. Y.
Ross Operating Valve Co., 120 East Golden Gate, Detroit, Michigan.
Valvair Co., 454 Morgan Ave., Akron, Ohio.

VALVES (Oxygen, Acetylene)

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

VENTILATING — See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

VENTS (Corebox)

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Demmler, Wm. & Bros., Kewanee, Ill.
C. M. Smillie & Co., 1124 Woodward Hgts. Blvd., Ferndale 20, Mich.

VIBRATORS

Adams Co., Dubuque, Iowa.
Air Compressors & Motors Inc., 3501 Croton Ave., Cleveland 6, Ohio.
Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.
Davenport Machine & Foundry Co., Davenport, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.
Nicholls Co., Wm. H., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.
S P O Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Frederic B. Stevens, Inc., 18 St. & Vernor Highway, Detroit 16, Mich.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

VISES (Hydraulic, Mechanical, etc.)

Desmond-Stephan Mfg. Co., Urbana, Ohio.
Wilton Tool Mfg. Co., 9525 West Irving Park Rd., P.O. Box 56, Schiller Park, Ill.

WASHES—See CORE and MOLD WASH

WEDGES (Foundry)

The Adams Co., Dubuque, Iowa.
Hardy Sand Co., P. O. Box 476, Evansville, Indiana.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WELDING APPARATUS (Electric arc)

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 14, Wis.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

WELDING, CUTTING and GOUGING APPARATUS and SUPPLIES

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

WELDING ELECTRODES (Carbon)

United States Graphite Co., Saginaw, Mich.

WELDING GAS—See GAS

WELDING RODS & ELECTRODES

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Carborundum Co., Perth Amboy, N. J.
International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.
Marquette Mfg. Co., 307 East Hennepin Ave., Minneapolis, Minn.

WHEELBARROWS

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WHEELS (Abrasive Contact)

Chicago Rubber Co., 2620 North Clybourn, Chicago 14, Ill.

WHEELS (Wire Brush)

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.

WIRE BENDERS

Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.

WIRE CUTTERS

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.

WIRE NAILS

Republic Steel Corp., 3100 E. 75th St., Cleveland 4, Ohio.

WOODWORKING MACHINERY

Oliver Machinery Co., Grand Rapids 2, Mich.

X-RAY EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Cystoscope Makers Inc., 129 East 78th St., New York, N. Y.

X-RAY FILM and ACCESSORIES

Eastman Kodak Co., Rochester, N. Y.

ZINC

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
George Sall Metals Co., 2300 East Butler St., Philadelphia 37, Pa.

ZINC BASE DIE CASTING ALLOYS

R. Lavin & Sons Inc., 3426 So. Kedzie Ave., Chicago 23, Ill.

ZIRCON SAND

Orefraction Inc., 7425 Thomas St., Pittsburgh 8, Pa.

THEY STAND THE HEAT!

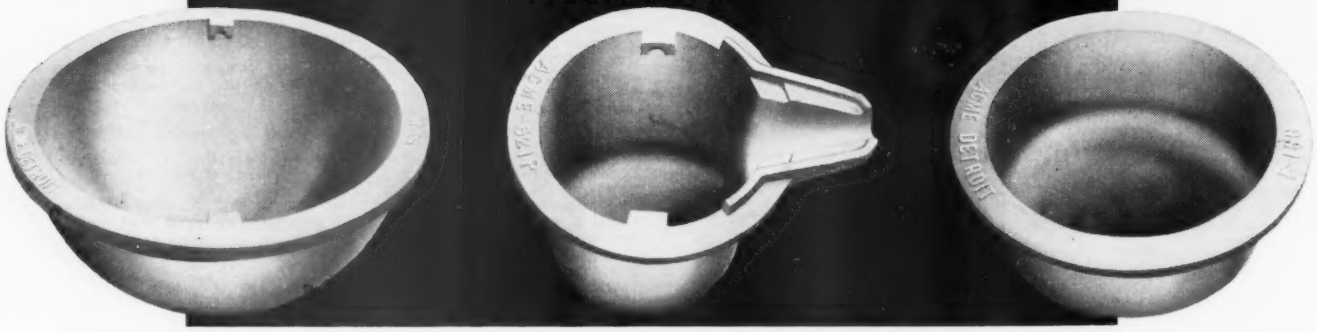
Acme { MELTING POTS / DIE CAST POTS / INGOT MOLDS

... FOR MELTING NONFERROUS METALS

MADE OF SPECIAL HEAT RESISTING IRON • WRITE FOR SCHEDULE OF 40 SIZES

Acme FOUNDRY COMPANY

2502 22nd St. Phone: Tashmoo 5-2404 Detroit 16, Mich.



CLASSIFIED ADVERTISING

Help Wanted

SALES MANAGER

to organize sales program, train salesmen, develop increased business nationally. Product is fine, established line of

FOUNDRY MOLDING MACHINES

These machines have an excellent reputation in the field, many salable features, backed by competent engineering staff, modern manufacturing facilities and trade advertising. Man we need must be outstanding in sales ability, is probably age of 35 and 45. Replies confidential.

BOX 545, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

PATTERN SHOP SUPERVISOR

A growing progressive gray iron foundry in northeastern Wisconsin pouring 150 tons daily is seeking a qualified supervisor to take charge of its pattern shop and pattern vault. Must be experienced in foundry techniques and capable of supervising 12 to 15 employees in the making and repairing of highly diversified and intricate patterns and core boxes of wood and metal.

In reply provide complete education and experience background, also list references and salary desired. Please do not write unless qualified.

BRILLION IRON WORKS, INC.
BRILLION, WISCONSIN

Help Wanted

SALES ENGINEER

Aggressive and successful AAA1 New York Company is making available for first time to industry nonferrous investment castings produced by unique company-created process. Lucrative opportunity exists for sales engineer with heavy technical sales experience in this field. Detailed resumes are requested and will be held in confidence.

BOX 551, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

PROJECT ENGINEER

Specialized gray iron foundry Mid-Ohio City of about 80,000 population. Various non-repetitive production problems including research and development under supervision of Vice-President. Recent graduate foundry option Industrial Engineer with some shop experience. Replies confidential. Write full details personal background, resume of experience, references and salary expected. Address: Box 499, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MOLDING FOREMAN

Gray iron production squeezer shop on miscellaneous small and medium work. Must have complete knowledge of molding procedures and be able to direct molders expertly to quality and speed production. New York City area. Give complete past experience in detail in first letter and salary desired. Address: Box 495, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

Steel process foundry. Salary open. Address: WALKER EMPLOYMENT SERVICE, 537 N.W. BANK BLDG., MINNEAPOLIS 2, MINNESOTA.

Help Wanted

PRODUCTION FOREMAN

Large malleable foundry has opening for production foreman thoroughly familiar with molding, gating and risering of malleable iron. Send resume including salary desired.

BOX 554, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

ASSISTANT FOREMAN

If you have brass foundry experience and supervisory ability, tell us about it. We operate a captive foundry in Chicago.

BOX 535, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

ELECTRICAL MAINTENANCE FOREMAN

Age 25-35. B.S.E.E. degree desirable. Familiar with steel foundry or steel mill problems and practices. Desired for permanent position in a leading Eastern steel foundry. This is not just another job. If you have ability and can think, opportunity exists. Send resume and salary expected.

BOX 546, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY SUPERINTENDENT

For cast iron sanitary, bronze, brass and aluminum foundry. Excellent salary, permanent position and unlimited opportunities, with a fast growing organization. This job is for our Canadian Plant. Address: Box 536, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted | Help Wanted

WANTED
MANUFACTURING MANAGER
OR
GENERAL SUPERINTENDENT

To direct manufacture of Iron and Steel Quality Castings
Well-established, progressive foundry
Employing 600-700 Workers

Best equipped, most modern job shop in United States
Ideal location in California

UNUSUAL OPPORTUNITY
Furnish education, experience, age, and references
BOX 530, FOUNDRY, PENTON BUILDING, CLEVELAND, OHIO

FOUNDRY
DEVELOPMENT
ENGINEERS

Two positions with progressive Ohio company that offers real challenge and opportunity:

1. Top notch spot for Mechanical or Electrical Engineer who has had eight to ten years development experience in all phases of foundry operations; with real emphasis on modern core making practices and techniques in moisture control of sand storage systems. This is a responsible position with unlimited authority in completely carrying out top priority projects as required and assigned by Foundry Division Manager.

2. Fine opportunity for young Mechanical or Electrical Engineer who has had three to five years production processing and varied foundry development experience; preferably in foundry molding, coremaking and auxiliary equipment. This position calls for cooperation with top level management and includes interesting activities in co-ordinating plans relative to development program.

Qualified applicants please reply fully. State complete history of personal background, work background, related qualifications, salary requirements, etc. All replies will be treated confidentially.

BOX 529, FOUNDRY
PENTON BUILDING **CLEVELAND 13, OHIO**

DESIGN ENGINEER

wanted

for design and

development of

FOUNDRY EQUIPMENT

Experienced man wanted. Must be thoroughly familiar with automatic molding equipment and foundry mechanization . . . Write for details; give us a brief letter on your experience. Replies confidential.

BOX 544, FOUNDRY
PENTON BLDG. **CLEVELAND 13, OHIO**

HELP WANTED

Production Engineer for shot and grit manufacturer. Must be thoroughly familiar with production methods and metallurgy.

BOX 558, FOUNDRY
PENTON BUILDING **CLEVELAND 13, OHIO**

METALLURGIST

Experienced in cast iron and foundry practice. Prepared to travel. State salary required and full qualifications. Address: Box 511, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

INDUSTRIAL ENGINEER

Thoroughly familiar with foundry operations, equipment and methods and experienced in establishing standards. Needed by average size job shop, steel foundry producing high quality castings. Give complete summary of background and salary requirements. All replies will be treated confidentially. Our foundry personnel know of this advertisement. Address: Box 543, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Qualified for medium-sized jobbing foundry located near Philadelphia, Pa. Electric furnace—steel, cupola iron and alloy iron castings. Floor and rollover machine castings, up to seven tons each. Must be capable to instruct and supervise melting, molding and coremaking.

BOX 540, FOUNDRY
PENTON BLDG. **CLEVELAND 13, OHIO**

MOLDING FOREMAN

A Southern jobbing steel foundry has need for an experienced supervisor in molding department. Should be familiar with loose pattern set-ups and be a leader of men. Write giving past history and salary expected. All replies confidential. Address: Box 548, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MECHANICAL DRAFTSMAN

Capable of establishing complete drafting department, including filing system by nationally known Kansas machinery manufacturers, expanding steadily. Give details and experience. All replies confidential. Address: Box 491, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

STEEL FOUNDRY SUPERINTENDENT

For established jobbing foundry in Pittsburgh district. Average production of 250 tons per month of electric furnace castings, ranging in weight from 10 to 7000 pounds. Prefer man thoroughly experienced in coremaking, molding, gating, etc. Please send complete data and salary expectations with first letter. Address: Box 542, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLEANING ROOM FOREMAN

A reputable southern foundry producing stainless and alloy steel castings has immediate need for a supervisor. Experience in all phases of cleaning room operations a prime requisite. Write giving resume of experience and salary expected. Address: Box 549, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

Positions Wanted

GENERAL MANAGER OR
ADMINISTRATIVE ASSISTANT

Experienced nonferrous general manager available for administrator or assistant. Operated nonferrous foundry, machine shop, pattern shop, heat treat. Technical work in iron and steel. Doing general industrial consulting. Good sales, operating, labor negotiation record. Age 47. Engineer. Native midwest. Willing to relocate. Address: Box 547, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

EXECUTIVE'S TECHNICAL ASSISTANT
OR RESEARCH DIRECTOR

Degree in Met. Eng., qualified by 15 years' practical experience and technical knowledge to Assist in reducing costs and defective castings, and developing improved methods of manufacture based on applied research. Ferrous and nonferrous experience. Address: Box 538, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WEIGHT ESTIMATING

Estimating of casting weights furnished by return mail. Accurate, reliable and confidential service. Automatic calculator equipment. Nominal fee. Send blueprints to: CHARLES E. ROLAND, ITASCA, ILLINOIS.

ASSISTANT CHIEF METALLURGIST

Graduate chemist, 37 years old, experience in electric arc furnace melting of carbon steel, manganese steel and heat resisting alloys. Good control for chemical and physical specifications. References. Address: Box 533, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PATTERN CHECKER

Years of experience in medium to heavy casting industry, expediting and coordinating. Address: Box 559, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MOLDING FOREMAN

Thirty-four years' experience. Fifty years of age. Desire position gray iron foundry which demands first quality castings with good production. Low scrap. Very cost minded. Experience all phases foundry practices. Address: Box 550, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

Thoroughly experienced in the management of gray iron production or jobbing foundries. Qualified to show you a highly efficient and low cost operation. If you are interested, Address: Box 556, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

EXECUTIVE

Experienced in all phases of foundry operations and management. Thorough knowledge of machine shop, pattern shop, engineering, metallurgy, foundry cost and estimating, sales and industrial relations. Registered mechanical engineer, 25 years' experience foreman, superintendent, general manager and vice president. Foundry running 150 tons daily. Address: Box 532, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOREMAN—WOOD PATTERNMAKING

Years of experience in medium to heavy casting industry. Iron and steel foundry background. Address: Box 553, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WORKING FOREMAN

Thirty years' experience, jobbing work, iron, brass, aluminum. All phases foundry work. Prefer small shop. West Coast only, age 45. Address: Box 557, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Employment Service

FOUNDRY PERSONNEL SPECIALISTS

National Placement and Procurement of

GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS. PERSONNEL DIRECTORS, PURCHASING AGENTS.

Confidential Inquires Invited
From Employers and Qualified Applicants.
For Fast Competent Assistance Contact

DRAKE PERSONNEL, INC. **FINANCIAL 6-2100**
JOHN COPE, DIRECTOR **7 WEST MADISON ST., CHICAGO, ILL.**

SALARIED PERSONNEL

$3,000-$25,000. This reliable service, established 1927, conducts confidential negotiations for high grade men who seek a change of connection under conditions assuring if employed full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, 241 ORANGE STREET, NEW HAVEN 10, CONN.

Representatives Wanted

WANTED

Agents now calling on foundries to sell patented lighting fixture designed for foundries. Exclusive. Attractive commission arrangement. No inventory. Excellent repeat business.

MIDWEST LIGHTING PRODUCTS CO.
P. O. BOX 536
CLEVELAND 7, OHIO

SALES REPRESENTATIVES WANTED

For large brass, bronze, and aluminum permanent mold foundry for territories handled out of Indianapolis, Indiana and Pittsburgh, Pennsylvania. Give all details on self in first letter.

ALCALOY, INC.
P. O. BOX 503 **TRENTON, NEW JERSEY**

WANTED

Manufacturers' Agent for aluminum production foundry located in Northern Ohio. Liberal commission. Address: Box 522, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Representative Available

MANUFACTURERS' REPRESENTATIVE

Desire additional lines in foundry field, supplementing refractory lines now carried. Many years of successful, aggressive sales representation. Operations cover all California. Address: Box 510, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Opportunity

ATTENTION!

State and local laws demand suppression of smoke and air pollution, and the foundry industry is responsive to comparatively inexpensive improvements. Now available, a dual spray cupola spark arrestor designed to insure positive fire protection and maximum suppression of air contamination. Simplified construction, dependable efficient performance, initial installation, low operating cost is of utmost interest to all gray iron foundries. Three exclusive designs are worked out to meet customers exact requirements. Two patents granted, and one pending now available on a royalty basis, with services of the designer to engineer and supervise the initial installations. This development merits attention of manufacturers who are considering a profitable diversification. For further particulars address: Box 539, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Wanted-To-Buy

WANTED

One 6-ton Bottom Pour Geared Ladle.
57 x 51 x 57.

CRUCIBLE STEEL CASTING COMPANY
MILWAUKEE 15, WISCONSIN
2850 S. 20th STREET

WANTED

OSBORN ROTO-LIFT
MOLING MACHINE
MODEL NO. 3161

PEORIA MALLEABLE
CASTINGS CO.
PEORIA, ILLINOIS
PHONE 2-5401

WANTED TO BUY

One American Sand Cutter, Model AA 96/61 or 6'0", 220-440. Must be in good condition.

INDUCTION ELECTRIC FOUNDRY
2428 E. 55TH STREET
LOS ANGELES 58, CALIF.

WANTED TO BUY

Will buy outright an investment casting company with or without present management. Reply directly or through your attorney or accountant.

BOX 532, FOUNDRY
PENTON BLDG. **CLEVELAND 13, OHIO**

WANTED

CENTRIFUGAL BLAST
MONORAIL
CLEANING CABINET

BOX 537, FOUNDRY
PENTON BLDG. **CLEVELAND 13, OHIO**

WANTED TO BUY

One #113-J SPO or one #276J Osborn portable jolt squeeze molding machine. Please send data regarding age and condition of machines, as well as prices. Address: STEEL HEDDLE MFG. CO., BOX 1899, GREENVILLE, S. C.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MACHINERY WANTED

Induction Furnaces, Screens, Simpson Mixers, Riehle Compression Testing Machines, Pulverizers, Grinders, Conveyors. Address: CONDENSER SERVICE & ENGINEERING CO., INC., HOBOKEN, NEW JERSEY, BA 7-0600.

Foundries For Sale

FOUNDRY FOR SALE

Gray iron foundry fully equipped. Fifteen tons per day capacity. Building 18,000 square feet. Railroad siding. Ninety miles from Cleveland. Good labor market.

BOX 528, FOUNDRY

PENTON BLDG. **CLEVELAND 13, OHIO**

FOUNDRY FOR SALE

Modern established brass and aluminum foundry in Mid-west. Tile, steel and glass building, 30 ft. by 105 ft. plus connecting office, melting room, covered sand and flask storage. Molding floor and furnaces covered by traveling crane. Real estate, building, equipment, inventory, etc. Room for expansion. Address: Box 541, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRIES FOR SALE

Established going foundry in Central Wisconsin. Fully equipped; manufacturing own line and general jobbing. Capacity up to ten tons per day. Over $70,000 value. Can be purchased for less than half. Principals only. Address: Box 531, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOR SALE OR LEASE

Well equipped brass and aluminum foundry in central Indiana. Would consider a partner. Address: Box 555, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

For Sale

NO REASONABLE OFFER REFUSED FOR THE FOLLOWING EQUIPMENT:

#70 Beardsley & Piper Speedmuller—100 HP motor; with skip hoist.
2000# Aluminum Fisher Tilting Furnace.
2000# Aluminum Stroman Hydraulic Tilting Furnace.
Dielectric Core Ovens—Model 900A & 1800A conveyor type—1949—will set up in your shop.
Osborn Core Blowers—Models 91, 94, and 193.
Herman Jar Rollover; 1944; 48" x 144"; 10,000#.
Int'l. RES Jolt Squeeze Pattern Draw-35" table.
#275J Osborn Jolt Squeezers.
#601 Osborn Jolt Rollovers.
#605 Osborn Jolt Rollover.
#2047-4 Osborn Power Rollovers.
Tabor Molding Machine 30" x 40"
Champion Push Off; Model LLA-45; 45" x 26".
#815 Johnston & Jennings Jolt Rollover Pattern draw; 30" x 40"; 15" draw.
#918 Johnston & Jennings Jolt Rollover-Clamp. Leveler, pattern draw; 44" x 54"; 18" draw; automatic take off—no pit required—excellent cond.
1000 lb. Air Hoists.

EXTRA SPECIAL

(6) 1000 lb. Monarch Hand Tilting Furnaces Each $275.00

BALCHER MACHINERY COMPANY
6020 EUCLID AVENUE
CLEVELAND 3, OHIO
EXpress 1-8930

For Sale

BUY—SELL—TRADE

15" Continuous Wheelabrator $4,500.00
27x36 Wheelabrator (Rubber Belt) ... 2,650.00
27x36 Wheelabrator (Iron Belt) 2,500.00
36x42 Wheelabrator 2,250.00
48x42" Wheelabrator 2,500.00
#2 Wheelabrator Table 8" Diameter with 8 auxiliary tables 28" diameter 3,500.00
Pangborn 6' Rotoblast table 8 auxiliary tables 3,500.00
Pangborn 6' Rotoblast table with flat sigle table 3,000.00
Pangborn ES-421 Shell Blasting Machine (Like New) 3,500.00
Vapor Blast Machine 800.00
Hand Blasting Cabinets (Like New)
Dust Collectors (Excellent Shape) all sizes
ALSO
Pressure tanks, elevators, blowers, motors, all types and sizes

DIAMOND SAND BLAST INC.
5654 W. JEFFERSON AVENUE
DETROIT 9, MICHIGAN
PHONE VINEWOOD 3-6750

FOR SALE

LIKE NEW—1952 MODELS Elwell Parker Platform Lift Trucks —10,000 lb. cap. with Ready-Power Units. COST $8000.00. SAVE 80%.

MERCURY EQUIPMENT CO.
1322 NO. ELSTON AVE.
CHICAGO 22, ILLINOIS
PHONE: Dickens 2-6370

FOR SALE

1—Tinius Olsen 100,000# Universal Compression Testing Machine
1—Magnaflux Demagnetizing Unit
Simpson Sand Mixers 18" dia. Laboratory #0, #1, #1½, #2, #3.
Miscellaneous: Screens, Pulverizers, Grinders, Conveyors—all types, Tyler Rotap Screens, etc.
OUR 38th YEAR

CONSOLIDATED PRODUCTS CO., INC.
66 BLOOMFIELD STREET
HOBOKEN, NEW JERSEY
HO 3-4425 N.Y. TEL. BA 7-0600

STEEL MELTING FURNACES

One 350 lb. cold charge. Never used. One 60 lb cold charge. Slightly used. One 17 lb. Model PT. Slightly used. All furnaces Detroit Rocker Indirect Arc with spare shells. Complete with meter panels, switches, and transformers. All wired for 220-volt 60-cycle. Will sell or trade for M. G. Induction unit.

FALLON INDUSTRIES
25800 GROESBECK HIGHWAY
ROSEVILLE, MICHIGAN
PH: PRESCOTT 7-2500

FOR SALE

American Wheelabrator, swing table 86" diameter, complete with motors and control panel. Practically new.

PYOTT FOUNDRY AND MACHINE COMPANY
328 NORTH SANGAMON STREET
CHICAGO 7, ILLINOIS

MOTORS — GENERATORS
TRANSFORMERS
Unused — Rebuilt
WORLD'S LARGEST INVENTORY
ELECTRIC EQUIPMENT COMPANY
Phone Station Collect GLenwood 6783
P. O. Box 51 — Rochester 1, New York

FOR SALE

SLY #4 blast mill, 20" dia. 20" deep, with dust collector, all motors. Good condition. Address: WOLVERINE FOUNDRY SUPPLY CO., DETROIT 7, MICHIGAN.

For Sale

FOR SALE

TURBO BLOWERS WITH MOTORS

CFM	PRESS.	MAKE	CFM	PRESS.	MAKE
6000	32oz.	Ing.-Rand	500	10oz.	No. Am.
4700	32oz.	Ing.-Rand	340	20oz.	A-B
4050	16oz.	No. Am.	320	12oz.	Spencer
2700	16oz.	Spencer	140	32oz.	Hoffman
2500	7oz.	Sturt.	9000	6"SP	Northern
2000	16oz.	Spencer	3420	8"SP	N.Y.
1150	20oz.	No. Am.	2500	½"SP	American
800	13oz.	Buffalo	2344	2"SP	Clarage
525	48oz.	Ing.-Rand	1100	4½"SP	Bayley

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE.
CLEVELAND 14, OHIO

FOR SALE

Two—Clearfield Sand Mullers, No. 610 complete with skip loaders, 20 HP motors, 220 volt; in operating condition.

PITTSBURGH STEEL FOUNDRY CORPORATION
P. O. BOX 986
PITTSBURGH 30, PA.

WILL SELL OR SWAP

1—Milwaukee Jolt-Strip, #1536-12, 1500 lb. jolt capacity
1—J & J Roll-over, #815, 1200 lb. jolt, 30 x 40 Table

FOR
2—Jolt, Squeeze, Strip Machines with 18 x 18 or 20 x 30 table.

BRUBAKER MFG. CO., INC.
LANDISVILLE, PA.

FOR SALE

1—20 ton Morgan Overhead Crane, 60' Span, 230 Volts DC, magnetic control. In stock.
1—5 ton Toledo Overhead Crane, 60' Span, 230 Volts DC. In stock.

MANY OTHER CRANES AVAILABLE.

TIPPINS MACHINERY CO.
PITTSBURGH 6, PA.

FOR SALE

250 cast iron jackets in sizes from 10 x 18 x 6 to 32 x 32 x 16.
Priced for immediate sale.

THE ELECTRON CORP.
651 RIO GRANDE AVE.
LITTLETON, COLORADO

FOR SALE

Young Brothers 2 compartment 7' x 7' x 7' each recirculating oven with all gas controls, vertical lift doors. Located Detroit. Subject to prior sale. Address: WOLVERINE FOUNDRY SUPPLY CO., DETROIT 7, MICHIGAN.

FOR SALE

MOLDING MACHINE, Herman, 6000 lbs. capacity jolt, roll, draw, 42" x 78" table, 43½" draw, in good operating condition. Located in Eastern Pennsylvania. A bargain, no dealer involved. Address: Box 517, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOR SALE

One No. 717 Type "A.F." Roots-Connersville blower. No pulley or relief valve. Address: NATIONAL FOUNDRY SAND CO., 2970 WEST GRAND BLVD., DETROIT 2, MICHIGAN.

FURNACES FOR SALE

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

FOR SALE

2" and 4" soil pipe machines, drop pattern type. Core machine and 100 shell type fitting patterns, snaps and binders. All or any cheap. Address: HERBERT J. BROWN, 2008 PORTLAND AVE., SHREVEPORT, LA.

CLASSIFIED ADVERTISING

For Sale

X-RAY MACHINE

1 Westinghouse Montemp tank control, S-980912, 100 gal./hr. Monotemp unit
1 Dryer, Model 1-WDD, Serial #2607
1 Westinghouse X-ray div. timer, Cat. #976937, Ser. #84622
1—Bulldog switch, type Jr., Cat. #336322P
1—Westinghouse transformer, Cat. #979875, Ser. #79676 (2) #597932
1 Thermox, style 979243, (Westinghouse)
1 Eastman electric X-ray timer
2 Wratton safelight lamps, Series 6-B, Model D
1 17 x 20 Radiographic illuminator
1 6¼ x 4¼ radiographic illuminator

BOX 534, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

YOUR CLASSIFIED ADVERTISEMENT IN FOUNDRY BRINGS RESULTS!

♦

IF YOU ARE SEEKING A CHANGE OF POSITION TO BETTER YOUR SITUATION AND ARE QUALIFIED FOR A BETTER JOB, TELL THE 66,000 READERS OF FOUNDRY ABOUT IT.

♦

DON'T "HIDE YOUR LIGHT UNDER A BUSHEL"—THERE ARE TIMES WHEN A MAN SHOULD TALK ABOUT HIMSELF AND THERE ARE A LOT OF MEN QUALIFIED FOR BETTER POSITIONS WHO DO NOT KNOW HOW TO GO ABOUT IT OR WHERE TO SEEK HIGHER RESPONSIBILITIES.

♦

YOUR CLASSIFIED ADVERTISEMENT IN FOUNDRY WILL BE WIDELY READ AND THE RESULTS MAY SURPRISE YOU!

♦

IT COSTS BUT LITTLE, WHY NOT RUN AN ADVERTISEMENT ABOUT YOURSELF IN TWO OR THREE ISSUES?

★ ★ ★

WRITE

FOUNDRY

CLASSIFIED ADVERTISING DEPT.

PENTON BLDG., CLEVELAND 13, OHIO

FOR SALE OR RENT

EQUIPMENT IN EXCESS OF OUR IMMEDIATE REQUIREMENT:

(2) Lima Shovels Model 2400, 6 yd. capacity. Cat. V12 with super charge and Torque Convertor. Location, Minnesota.
(1) 1201 Lima 3½ yd. Shovel. Latest model and latest equipped. A-1 condition and ready to go to work. Location, Minnesota.
(1) Lima 802 — 2yd., Torque Convertor, shovel front, 24'6" boom, dipper stick —18'. Location, Minnesota.
(1) Lima 603 with shovel front. Approximately $2000.00 worth of spare parts. Diesel power. Location, Iowa.
(1) 603 Lima 60' boom, rudamatic tagline, and fairleads. Cat. Diesel Engine. Machine in excellent condition. Location, Iowa.
(1) Lima 34 Paymaster. Combination Pull Shovel and Crane Boom. GMC 671 diesel power. Location, Minnesota.
(1) Marion 2½ yd. Shovel with Buda Diesel. Approximately $6000.00 worth of spare parts. Location, Minnesota.
(1) 2 yd. Marrion all electric Shovel. Location, Minnesota.
(1) Marion all electric combination shovel and Crane. Location, Mich.
(2) 40 ton Locomotive Cranes. Location, Minnesota.
(1) 20 ton Industrial Locomotive Crane. Location, Minnesota.
(1) Bucyrus Erie 44B combination Shovel and crane. Good condition. Location, Minnesota.
(1) 37B Bucyrus Erie 1½ yd. Machine has new D13000 Cat. engine. Location, Minnesota.
(1) P&H Model 700 combination Shovel and Crane. GM power. Excellent condition. Location, Minnesota.
(1) P&H Model 955 with shovel front. D17000 power. Location, Ill.
(1) 80D Northwest 2½ yd. Shovel. New in 1952. Location, Minnesota.
(2) 104 Northwests, 1¼ yd. 50' booms. Good condition. Location, Iowa.
(7) 1¼ yd. Northwest Cranes. 50 to 65' booms. high Gantry. Long wide crawlers. Good engines. Some have fairleads for dragline work. Location, Illinois.
(1) 1¼ yd. Northwest Crane. 50' boom. Fairleads with 1 yd. Clam shell Bucket. Rudamatic tagline. Location, Iowa.
(2) 1¼ yd. Northwest Cranes, 55' booms. Engines rebuilt in 1955. Location, Wisconsin.
(1) 1¼ yd. Northwest with 55' crane boom and shovel front combination. Location, Michigan.
(1) 1¼ yd. Northwest, combination shovel and 50' crane boom, fairleads. Location, Michigan.
(1) 1¼ yd. Northwest, 65' crane boom, high gantry, extra long crawlers. Location, Michigan.
(1) 1¼ yd. Northwest, 45' crane boom, fairleads, lights. Lacation. Michigan.
(1) No. 6 Northwest; long, wide crawlers, 65' boom, high gantry. Location, Wisconsin.
(1) Model 25 Northwest, shovel and crane combination, new in 1953. Location, Wisconsin.
(1) Unit ¾ yd. with shovel front. Was new in 1948. Overhauled and rebuilt in 1955. Location, Wisconsin.

We carry one of the largest spare parts stock for Model 104 Northwests in the country.

(15) 1½ yd. Clamshell Buckets. (2) 2 yd. Clamshell Buckets.
(2) Austin Westerns, combination shovels and cranes. Rebuilt and working every day.
(1) 4 yd. Koehring, Tilt Mixer. New.

EUCLID AND MACK TRUCKS

(8) 30 ton Mack end dumps. Model F-C-S-W. Serial No's. 1244-47-52-53-55-56-59-60. With approximately 50 tons of spare parts. Location, Minnesota.
(38) Euclid, Mack, and Darts. All end dumps, from 12 to 34 ton. Late model trucks. All above trucks are painted, cleaned, overhauled and ready to go into operation.
(6) 59TD, 22 tonners. Serial No's. 14913-15723-24-25-27-28.
(10) No. 8TD, 22 tonners. Serial No's. 6581-82-84-89-72-96-97-90. Have N-H-R-S Cummings engines and heated boxes.

BLAST HOLE DRILLS

(1) 27T Bucyrus Erie Blast Hole Drill complete with tools.
(1) 22T Bucyrus Erie Blast Hole Drill complete with tools.
(5) 29T Bucyrus Erie Blast Hole Drills complete with tools.
(2) Core Drills complete with tools. All the above drills are located in Minnesota.

TRACTORS, SCRAPERS, AND GRADERS

(1) TD24 International with dozer and PCU.
(2) TD24 Internationals with PCU and Pusher Plates.
(1) D8 Cat. and 12 yd. Scraper. Also Bulldozer. Manganese tracks. Machine rebuilt in 1955.
(1) D8 Cat. with Cat. 80 Scraper. New in 1954.
(2) Tourneau Dozers with 671 GM engines.
(1) Root Rigger.
(2) Galion. Model 118, Motor Patrol. New in 1953.

The above machines are located in Minnesota.

TRUCKS AND TRAILERS

(1) 20 ton 6 by 6 Reo Tractor with front winch. Mileage—6000.
(2) White W-22.
(1) Model W-26 with dump body.
(3) F8 Ford 1952 tandems. 14' light weight dump bodies.
(8) LF 195 International tandem Tractors. 450 engines. Large Henderson dollies.
(8) 5 ton 4 wheel drive Federals with 510 Hercules engines and 5th wheel. 920 rubber.
(1) Auto Car with single axle Gram Trailer. Semi dump.
(1) New 50 ton Low Boy Trailer. Legal width.
(1) Heavy duty Low Boy with tandem diesel Tractor.
(1) TD14 with 2 yd. Drott Loader. New condition.
(9) Tandem axle Semi Dump Trailers. Cable lift.
(4) Single axle Semi Dumps.

CRUSHERS

(1) 2036 Universal Jaw Crusher.
(1) 25 by 40 Roller Bearing Jaw Crusher.
(1) Cedarapids Pitmaster Portable Crushing Plant. New in 1954.

The above equipment is located in our Wisconsin, Michigan, Indiana, Illinois, Minnesota, and Iowa plants.

TERMS TO RESPONSIBLE PARTIES

FOR FURTHER INFORMATION OR INSPECTION CALL THE Lyle T. Manley Co., Manley Bros. Inc. at any of the following offices. Home office: Rockton, Ill., phone 2-4221—2-5581—2-8511. St. Paul, Minn. office: The Pioneer Bldg., phone Capitol 4-7010. Gary, Indiana office: 1050 Ogden Dunes, phone Ogden Dunes 2925 or 3820. Ed Heaton Foundry Division, St. Paul, Minn., phone DeSoto 5631. Kenosha, Wis. office: 7824 Pershing Blvd., phone Olympic 2-1743.

LYLE T. MANLEY CO.

FOR SALE

American Wheelabrator Tumblast, 48" x 48" complete with loader, dust collector	$6000.00
American Wheelabrator Tumblast, 36" x 42" with dust collector	32.50.00
25—Osborn 2047-4 jolt rollover, molding machines 18" x 24" tables, 8½ draw	300.00
23—Tabor 10" squeeze	100.00
Tabor 30" x 40" HYD jolt rollover	1200.00
SPO 110PJ jolt squeeze	225.00
SPO 113PJ jolt squeeze	300.00
Berkshire jolt squeeze	225.00
Osborn 712PJ jolt stripper, 18" x 28" table, 6" draw, 12" cylinder	750.00
Milwaukee jolt stripper, 32" x 38" table, 10" draw, 16" cylinder	1250.00
Simplicity shakeout, 6' x 8'	600.00
Flotex 4' x 6' shakeout	900.00
B & P #40 muller	1000.00
Simpson #0 muller	600.00
B & P Screenarator	275.00
B & P Screenarator, 5 HP motor	600.00
3—Royer portable sanditioners, large size	150.00
Hardness tester, Gogan Electric, 4500 KG, Brinell	500.00
Gehnrich core oven, 5' x 4' x 5'	300.00
Gehnrich core oven, 10' x 9' x 10'	750.00
3—27" x 36" American Loaders	300.00
Spencer Turbo Blower, 16 oz. 800 CFM, 5 HP motor	300.00
Rotoclone dust collector, sludge type, 2500 CFM, 5 HP motor and blower	750.00
American Dustube #185, 16550 CFM with 25 HP motor and blower	1750.00

Pangborn sand blasting tanks, rooms, abrasive separators, elevators, dust collectors.

M. EISTEIN
422-426 GRAND STREET
JERSEY CITY 3, NEW JERSEY
TELEPHONE HE-5-7571

FOR SALE

MOLDING MACHINES

1—Herman, Jolt, Rollover Draw, 6000#, 40" x 60" table.
1—Herman, Jolt Stripper, 48" x 54" table.
2—International, Jolt, Rollover Draw, 24" x 10G, Stationary.
2—International, Jolt, Rollover Draw, 20" x 8-G, Portable.
1—SPO #305 Jolt Stripper.
2—No. 275 Osborn jolt squeezers.
2—SPO #611B stationary oscillating, jolt, squeeze strippers.

CORE OVENS

1—Coleman Recirculating 3 section with 5 drawers per section. Gas fired.
1—Coleman Recirculating 4 section with 5 drawers per section. Gas fired.

BLOWERS FOR CUPOLAS AND FURNACES

1—Connersville Rotary Blower, 3500 CFM.
2—#7½ Roots rotary blowers—27 x 81—14000 CFM.
2—Connersville Rotary 14" x 27" HD, 2750 CFM at 5# press.
1—Connersville rotary blower 22 x 66 45 cu ft. per revolution 9000 CFM.

Maxon-Premix Blowers for Gas ¼ to 1 HP.

2—5 HP 20-oz. Spencer Turbine Blowers.
2—2 HP 20-oz. Spencer Turbine Blowers.

METAL MELTING EQUIPMENT

1—1000# open flame brass melting furnace, gas fired.
1—Hausfeld Stationary Brass, oil or gas burner, 200# cap.
1—Hausfeld Tilting crucible, gas, 250# Al, Cap.
1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired.

MISCELLANEOUS

1—Pangborn 1 to 4 nozzle air blast generator, complete.
1—Sullivan, 2 stage compressor, 14-8¾ x 10, 75 HP.
1—20 HP U. S. Four Speed Snagging Grinder, 24" x 3" wheels.
1—International SB-11 core blower.
2—Pangborn cloth screen collectors, 2 HP.
1—Stoney crane type shakeout.
1—NC-4 Royer sand separator.
1—#1 Demmler core blower.
1—#16 Roto-clone unit complete.

Complete stock of rebuilt mill and dust exhaust blowers.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST. CINCINNATI 3, OHIO

GUARANTEED MACHINERY & EQUIPMENT VALUES . . . . . .

AIR COMPRESSORS

1—**BURY** Class URB, size 8 x 8, single stage horizontal, 180 CFM, w/30 HP
1—**CHICAGO-PNEUMATIC** Size 8 x 8, single stage Horizontal, 180 CFM w/30 HP motor.

AIR & ELECTRIC HOISTS

22—**INGERSOLL-RAND** Air Hoists, 700 lbs capacity through 10,000 lbs, all sizes and models, latest type, with trolleys or hooks for hanging.
1—**COMET** 1000 lbs capacity, electric 220V.
1—**DETROIT** 5 ton cap. Model LHR.
1—**ELECTRO-LIFT** 3000 lbs cap. 4 HP
1—**SHAW-BOX** Load Lifter Jr. 1000 lbs

CORE BLOWERS

2—CB-400 **CHAMPIONS.**
1—#1 **DEMMLER.**
2—#91 **OSBORNS.**
1—**DEMMLER 3K.**
2—#91 **OSBORN.**
1—#192 **OSBORN.**
1—**FEDERAL** CB-40 San-Blo—1951 Unit.

CUT-OFF SAWS & STRAIGHTENERS

1—**TESSMER** Model H Sprue Cutters.
1—**CLIMAX** #2A Wire Straightener.
1—**AMERICAN** Type D Rod Straightener & Shear, ¾" shear, 1¼" straightener, 1952 unit.

CONVEYORS—ROLLER-BELT—TROUGH

1—**FARQUHAR** 18" x 35' portable Trough.
1—**FARQUHAR** 18" x 19' Car Unloader.
5000'—**MATHEWS** Gravity Roller Conveyor, 10"—16"—18"—24" width rollers, standard & heavy duty, FOUNDRY TYPE, all above rail.
2—35' x 24" **TROUGHING,** with idlers, belting, pulleys, motorized.
190'—**LOUDEN** Mono-Rail—4—20' bridges.
1—**LINK-BELT** Overhead Conveyor, 100' track, chain, trolleys, curved, motorized, NEW.
1—18" x 48' inclined trough, with idlers, belting, pulleys, motorized.

CUPOLA & FURNACES BLOWERS

1—**INGERSOLL-RAND** Centrifugal Type FS-367 with 100 HP motor.
7—Furnace Blowers 1-3-5-7½ HP, 16 oz.

HEAT TREAT & ELECTRIC FURNACES

1—**LINDBERG** Model 4860GH, Cyclone Type Gas fired, with all controls.
3—**DETROIT** Type AA Rocking 1500 to 2000 lbs, w/400 KVA Transformers.
2—**DETROIT** Type AA Rocking 750 to 1000 lbs, w/250 KVA Transformers.

GAS & OIL FIRED FURNACES

3—**LINDBERG-FISCHER MNP** Size 2400 lbs gas or oil fired, motorized, complete.
1—**LINDBERG-FISCHER MNP** Size 225 lbs, gas or oil, w/motor-blower etc.
2—**LINDBERG-FISHER** Type BBI, 400 lb crucible type, hand tilt, gas or oil.
1—**STROMAN** Model U, 600 lbs Reverberatory, tilting, gas or oil fired.
2—**STANDARD** #30 & #150 Crucible, Stationary, gas or oil, w/motor-blower.
1—**HAUSFELD** #200 Crucible, stationary, gas fired, NEW 1952.

G. E. INDUSTRIAL X-RAY

Model KX 10, Type 1, 115 volts, 50/60 cycles, 13 amps. Serial 425456.

GRINDERS—SWING—SNAGGING—STAND

2—**FOX** #5 High Speed Stand, wheel 24" x 3"—10 HP motor.
1—**FOX** #7 High Speed Stand, wheel 30" x 3"—15 HP motor.
1—**HAMMOND WR-1** Double End Snag, wheel 24" x 3"—10 HP motor.
1—**MARSCHKE** 3 HP Swing Frame, 2-speed.
2—**MARSCHKE** 15 HP Swing Frame, 2 speed.
1—**MARSCHKE** 20 HP Swing Frame, 3 Speed.
1—**QUEEN CITY** #100 Double End Disc.
1—**U. S. ELECTRIC** Swing Frame, 15 HP, 2 speed, wheel 24" x 3" x 12".
6—**U. S. ELECTRIC** #65 Snag Grinder, 15 & 20 HP models—4 speeds, max. wheel 30" x 4".

LADLES & POURING DEVICES

6—**INDUSTRIAL** Lip Pour 24" x 24" rated 1600 lbs, enclosed Timken Gearing.
6—**MODERN** Model FA-9 Pouring Devices with ladles, trolleys & tilt devices.
2—**MODERN** Mixing Ladles, 40" x 60", on trunnions, geared, covered, lined.
4—**MODERN** 1500 lb. Cylindrical Type, 29" x 30", w/bails, covers & stands.
10—**WHITING** Models 1000 & 2000 Pouring Devices w/400 lb ladle, hand tilt.
3—**WHITING** Crane Type ½ & 1 ton cap.

MOLD CONVEYOR

PALMER "B" 200' track, 80 cars, 18" x 42", with all drives and motors etc. Both straight and curved track.

MOLDING MACHINES

1—**DAVENPORT** #28 RO Jolt Rollover & Pattern Draw 30" x 40" table, 12" draw.
2—**INTERNATIONAL** RES Jolt Squeeze Rollover Draw, Size 15" x 8" draw.
1—**INTERNATIONAL** PKL Jolt Squeeze Strip, 18" x 24" table, 6" draw.
2—**INTERNATIONAL** G, Jolt Rollover Foot Draw, 18" x 56" & 20" x 8" size, draw 8".
1—**INTERNATIONAL** LP-10 Jolt Pin Lift.
2—**MILWAUKEE** No. 124 Jolt Squeeze, 12"
5—**OSBORN** #275J Jolt Squeezers, 10" cyl.

G. E. INDUCTION MOTOR GENERATOR SET

1—300 KW **G.E** alternating current generator, 800 volt, 3600 RPM, 1 phase complete with 425 HP G.E. motor and control panel.

2—**OSBORN** #710J Jolt Squeeze Pin Lift, 16" x 25" table, 6" draw, 10" squeeze
2—**OSBORN** #712PJ Jolt Squeeze Pin Lift, 18" x 28" table, 6" draw, 12" squeeze
1—**OSBORN** #342-1 Jolt Rock-Over Pattern Draw, 23" x 38" table, 10" draw, 1000# Jolt.
3—**OSBORN** #559 Jolt Strip, 25" x 30" table.
2—**OSBORN** #405 Jolt Rollover, table 57" x 64", 26" draw, 3000 lbs jolt cap, w/roll-out.
3—**OSBORN** #721 Jolt Squeeze Pin Lift, 22" x 26" table, 6" draw, 800 lbs. jolt.
4—**OSBORN** #210 PJ Jolt Squeeze 16" x 20" table.
5—**OSBORN** #601 Jolt Rollover Pattern Draw, 600 lbs jolt cap., 30" flask size, 10" draw.
6—**OSBORN** #602 Jolt Rollover Pattern Draw, 22" x 36" table, 10" draw, 750 lbs Jolt.
2—**OSBORN** #142 Jolt Rollover Hand Draw.
4—**OSBORN** #40 & #42 Hand Core Rollovers.
2—**HERMAN** Jolt Rollover Pattern Draw, 6000 series, 42" x 78" table, 6000 lbs Jolt.
2—**HERMAN** 40" x 60" Plain Jolt.
1—**JOHNSON & JENNINGS** #815 Jolt Rollover Pattern Draw, 30" x 40" table.
2—**TABOR** 22" x 42" Shockless Jar Rollovers.
2—**TABOR** 30" x 40" Shockless Jar Rollovers.
2—**SPO** #506 Jolt Rock-Over—24" x 25" table.
2—**SPO** #507 Jolt Rock-Over Pattern Draw, 32" x 40" table, draw 10 to 20".
1—**SPO** #508 Jolt Rock-Over Pattern Draw, 28" x 30" table, 9" draw, 1200# jolt.
6—**SPO** 110J Jolt Squeezers, 10" cyl.

SAND MULLERS

1—**BEARDSLEY & PIPER** #60 Speed Muller, 10 cu. ft. with 50 HP motor.
1—**BEARDSLEY & PIPER** #50, Speed Muller w/skip hoist, dust hood, 50 HP motor, etc.
1—**BEARDSLEY & PIPER** #30 Speed Muller.
1—**BESSER** 36" x 42" Blade Type Mixer, horizontal drum, 12 cu. ft., w/7½ HP motor.
2—2500# capacity Sand Larry, portable, w/Fairbanks Morse Dial.
3—**SIMPSON** #2 style UD—6' pan diam. 1500# batch, with skip loader, water meter, latest type.
5—**SIMPSON** #3 style C, separate drive enclosed gearing 8' pan diam, 3000# batch, w/motor & reducers.
1—**SIMPSON** #1H, 4' pan diam. unit drive, 500# batch size.
1—**SIMPSON** #1½, style UD, 4'6" pan diam., 700# batch, w/skip hoist, water meter, etc.

SAND BLASTING EQUIPMENT

1—**HYDRO-BLAST** Type M, Wet Abrasive, 7'5" v 4'5" x 8', door opening, 40" x 28", w/tank, 40 HP motor etc.
1—**PANGBORN** #7GK-2 Rotoblast Barrel, 30" x 38" drum, 7 cu. ft. cap. airless type, w/skip hoist.
1—**PANGBORN** EP-5 shot blast cabinet, 5' x 4' x 7' w/pressure tank, elevator.

SAND PREPARATORS

3—**B & P** Model M Screenerators.
1—**B & P** #70 Portable Preparator w/gyrating screen, aerator, magnetic separator, 90 cu. ft. hopper.
1—**AMERICAN** Model AM Cutter, size 69/45.
1—**AMERICAN** Model BD Cutter, size 75/60.

SAND SLINGERS

1—**B & P** 19" Tractor Type, 13' arm.
1—**B & P** 16" Tractor Type, 13' arm, magnetic tower, 4' ramming 4" tip.

SHAKEOUTS & SCREENS

1—**ROYER** Combination Shakeout & Sand Conditioning unit, serial #ST-47.
4—**SIMPLICITY** 4' x 6' Model B, 5000#.
1—**SIMPLICITY** 2' x 3' Model CA-VM Gyrating Sand Screen, 1 HP-V-belt
1—**SIMPLICITY** 4' x 10' Model D with Automatic Crusher, 15,000# load.
1—**STONEY** Core Knock-Out 8" x 20" head.

SAND RIDDLES

10 — **UNIVERSAL** "Roto - Plane" Speed sifter, 20" diam, with 1/3 HP motor.
1—**COMBS** Type V Gyrating, 20" dia, 1/6 HP.

TUMBLING BARRELS

1—**SLY** 36" x 60" with 5 HP Gearhead motor—built in magnetic brake.
2—**SLY** 42" x 72" Square, with 10 HP Gearhead motor — built in magnetic brake.
1—**SLY** 42" x 66" Type C—10 HP motor.
1—**SLY** 24" x 36" with motor & drive.

SPECIALISTS IN COMPLETE FOUNDRY LIQUIDATIONS

AAA MACHINERY & EQUIPMENT CO.

15539 SARANAC ROAD — CLEVELAND 10, OHIO — CALL LI. 1-6545

CALL TODAY LI-1-6545

FOR SALE

AIR COMPRESSORS

1—150 H.P. 800 CFM Ingersoll-Rand two-stage 230V, 3 ph. 60 cy. with air receiving tank.
1—20 H.P. 110 CFM G-E two stage, 250 V. D.C.

AIR HOISTS

1—6 ton Detroit Pneumatic with trolley.
3—2-ton I-R, C-P.
1—700 # I-R.
12—Pendant Curtis Class G 1 to 3 ton.
8—Pendant Hanna 5" x 36" cyl.

CONVEYORS

5—Bucket elevators.
2—11" belt x 33'6" and 37' centers.
1—14" belt x 51' centers.
2—20" belt x 48'6" and 56' centers.
1—Bucket elevator for coke 80' centers, double strand chain and continuous buckets.
1—Sorting conveyor, 44' centers, 30" wide steel plates, L-B chain.
18—Sand handling conveyors.
2—18" belt x 38' and 155' centers.
1—20" belt x 122' centers.
12—24" belt x 25'6", 29'6", 40'6", 45', 69', 93'93'93', 93'93'106', and 118' centers.
2—30" belt x 33' and 42'6" centers.
1—36" belt x 30'.
3—Steel Apron Conveyors.
2—30" wide x 15' and 57' centers.
1—21" wide x 5'6" centers.
Roller Conveyor—8", 10".
1—Link-Belt Roller Type Power Mold Conveyor, 27' x 70'6" centers, 35 cars 38" x 72", 45 ft. per min. with frame work, take-ups, idler corners, driving mechanism, speed reducer, motor and controls.
1—Pigmold conveyor 64' sprocket centers, Link-Belt complete with drive 220/440/3/60.

CORE BLOWERS

DEMMLER
2—#2 weight of core up to 25 lbs.
1—#2K weight of core up to 25 lbs.
1—#3 weight of core up to 35 lbs.
1—#3E weight of core up to 35 lbs.
OSBORN
9—#92 weight of core up to 35 lbs.
1—#194-1 weight of core up to 100 lbs.
REDFORD
3—Cartridge bench type.

CRANES

1—3 ton—3 motor Bedford bridge crane, 40' span, double built up steel bridge with catwalk man cab, drum controls, roller collectors, 30 H.P. Hoist motor, 10 H.P. travel motor, 3 H.P. trolley motor, 220/440/3/60.
2—12' Cleveland hand traveling bridge cranes.
2—3 ton Shepard Cupola Charging Cranes, DC 550V. cab operated, with monorail.
Gib cranes ¼ to 2 tons.

FURNACES AND BLOWERS

FURNACES

STROMAN
2—200/225 NP hydraulic tilt with blowers.
CAMPBELL-HAUSFELD
2—2000# IPNT electric tilting, 2 burners.
BELLEVUE
4—#200 with oil burner, hand tilting.
FISHER
1—#500 MNP Nose Pour, electric tilting.
2—#1000 Rotary hand tilting, oil burners.
ELECTRIC
1—6000 lbs. Heroult-Lectromelt, 3000 KVA 13200 primary volts, 239-85 secondary volts, Delta Y with taps, 3 phase 60 cycles, complete controls.
HEAT TREATING
1—G. E. 30" x 42" 1800° 37 KW 220V. 1 ph. 168 amps.
ANNEALING
1—Bellevue Combination Oil & Gas with controls.

FURNACE BLOWERS

3—3 H.P. 300 CFM 16 oz. 220/440/3/60.
3—7½ H.P. 975 CFM 16 oz. 220/440/3/60.
1—15 H.P. 2100 CFM 16 oz. 220/440/3/60.

CUPOLA BLOWERS

1—Spencer Turbine, 50 H.P., 6750 CFM, 16 oz., 220/440/3/60.
1—North-American, 20 H.P., 1950 CFM, 20 oz., 220/440/3/60.
1—Piqua Size 5½, 6000 CFM, 16 oz., 220/3/60, 30 H.P.

EXHAUSTERS

1—Sturtevant Silentvane, Size 75, 5 H.P., 220/440/3/60.
1—Sturtevant, Size 6, Type CS, 10 H.P., 220/3/60.
1—Roto-Clone type "D", size 10.

GRINDING EQUIPMENT

2—Fin Cleaning Machines for cylinder heads —Ireland.
1—#230 Gardner double end disc, 30" wheels, V-belt.
3—5 H.P. Safety Emery Wheel Co., 18" x 3" wheels, 220/440/3/60.
1—10 H.P. Black & Decker dble. end 20" x 3" wheels, 220/440/3/60.
1—7½ H.P. Universal Swing Grinder, 220/440/3/60.
3—20 H.P. Marshke Swing Grinders, 440/3/60.
1—#24 Gardner Horizontal disc grinder, 54" diameter, 20 H.P., 220/440/3/60.
1—#19 Besly Horizontal disc grinder, 52" diameter, 15 H.P., 220/3/60.

LADLES

MODERN & WHITING
15" to 27½" diameter, 250 lbs. to 2000 lbs. capacity with Modern type FA Pouring devices.
2 ton and 3 ton Teapot spout, E-Z Pour enclosed gearing.
2—6000 lbs. Modern Mixing ladles, elec tilt.

MOLDING MACHINES

JOLT ROLLOVER AND PATTERN DRAW

DAVENPORT
2—SA-28, 1500 lbs. jolt, 12" draw, 30" x 40" table, air clamps.
2—SA-34, 2500 lbs. jolt, 15" draw, 34' x 48" table, air clamps.
1—SA-40, 3000 lb. jolt, 18" draw, 40" x 60" table.
HERMAN
1—6000 lbs. jolt, 42" x 60" table, air clamps, pit type.
OSBORN
1—405-95, 26" draw, 3500 lbs. jolt, 40" x 60" table.
2—602, 36" flask, 600 lbs. jolt.
6—601-13, 10" draw, 900 lbs. jolt.
8—2047-4, 8" draw, air clamps.
1—422 with swing out table.
SPO
1—9336, 9½" draw, 800 lbs. jolt, 22" x 28" table.
TABOR
2—22" x 32" table, 10" draw, 6000 lbs. jolt, air clamps.
1—24" x 42" table, 10" draw, 600 lbs. jolt, air clamps. Never used.

JOLT SQUEEZE PIN LIFT

MILWAUKEE
1—145-1, 8" draw, 1700 lbs. jolt, 25" x 30" table. 14" squeeze cyl.
4—4" draw, 11" squeeze cyl., 17" x 21" table.
OSBORN
2—814-P Stationary, 8" draw, 700 lbs. jolt, 14" squeeze cyl.
1—714PJ Stationary, 7" draw, 20" x 31" table, 14" squeeze cyl.
5—720 Stat., 4" draw, 11" squeeze cyl., 19" x 22" table.
1—721 Stationary., 6" draw, 13" squeeze cyl., 22" x 26" table.

JOLT SQUEEZERS

HAYNES
INTERNATIONAL LJS
MILWAUKEE 124-6, 103
MODERN
OSBORN 275J, 210PJ
SPO 113P
TABOR

JOLT STRIPPERS

INTERNATIONAL
3—LP-6, 8" draw, 1000 lbs. capacity, Pine adj. 16" to 24".
JOHNSTON & JENNINGS
1—68SP, 8" draw, 600 lbs. jolt, 25" x 30" table, portable.
OSBORN
1—559, 6" draw, 1200 lbs. jolt, 25" x 30" table.
1—559-HD, 6" draw, 1200 lbs. jolt, 25" x 30" table, portable.
1—561-41, 12" draw, 5000 lbs. jolt, 40" x 50" table, pit type.
HERMAN
2—40" x 60" table, 6000 lbs. jolt.

ROCKOVER AND DRAW

INTERNATIONAL
4—"R" hand ram, hand rollover, 8" and 10" draw.
MODERN
2—2-38 hand ram, hand rollover, hand draw.
OSBORN
1—147-1, 20" x 60" core box max.
1—146, 24" x 32" core box max.
PRIDMORE
1—Hand ram, power rollover.
SPO
1—506, 24" x 25" table, 600 lbs. jolt, 10" draw, stationary.
CHAMPION
2—Type 4 22" hand rollover, 12" draw.
1—Type W 16" hand rollover, 8" draw.
PUSHOFF
2—size 38" x 40" Champion, 10" draw.
1—Osborn 3' x 16' table.
PLAIN JOLT
1—Osborn No. 98, 220 lbs. jolt, 12" x 12" table.
1—Tabor Model B-4, 700 lbs. jolt, 18" x 24" table.
1—International, Type J, 1300 lbs. Jolt, 31" x 44" table.
1—International, Type J, 3000 lbs. jolt, 36" x 48" table.
1—International, Type J, 10,000 lbs. jolt, 76" x 76" table.
SHELL MOLDING MACHINE
1—Shalco, Model CO-1, ser. #79, new condition.

SCALES

TOLEDO
1—6500 lbs. dial floor scale, 5' x 7' platform.
FAIRBANKS-MORSE
2—Printomatic dial scales.
1—Core Sand scale with hopper.

SAWTABLE

CRESCENT
1—36" band saw.

SAND SLINGERS

1—Motive Junior Beardsley-Piper, 19" head, 4" tip, 220/3/60.

SHAKE-OUTS

ROBBINS
1—4' x 10', 12,000 lbs. capacity with 7½ H. P., 220/440/3/60 "Floatex".
MIDWEST
1—120' x 36" Apron shakeout conveyor.

SAND MULLERS

SIMPSON
1—#2 Model H, Type E with skip bucket, 220/440/3/60, 20 H.P., 14 cu. ft.
1—#3 Model H, Type E, 220/440/3/60, 60 H.P., 30 cu. ft.
2—#3 Model C, Type E, 220/440/3/60, 60 H. P., 30 cu. ft.
2—#3 unit drive, 220/440/3/60.
BEARDSLEY-PIPER
1—#70, 29-58 tons per hour, 18 cu. ft. per batch, 100 H.P., 220/440/3/60.
1—#30, 6½-13 tons per hour, 4 cu. ft. per batch. 20 H. P., 220/440/3/60.
LINK-BELT
1—Paddle type, 20" x 72".
1—Pugmill, 42" x 96".
BLYSTONE
1—#2A—5 cu. ft., 3 H.P., 220/440/3/60.

SAND CONDITIONERS

ROYERS
2—C-2, 10 to 15 tons per hour, 1½ H.P., 1750 RPM motor.
LINK-BELT
1—Aerator with drive and motor.
RAPP
1—No. 27 Revivifier.
AMERICAN
2—Sand Cutters, Type AA, 4' 8" and 5' 2", 220/440/3/60.
1—Sand Cutter, Type 74-50 "AM", 440/3/60.

SAND BLAST EQUIPMENT

AMERICAN WHEELABRATOR
1—42" x 48" Wheelabrator, 200/440/3/60.
1—36" x 42" Wheelabrator, 220/440/3/60.
1—6' Tablast, 220/440/3/60.

MAGNESIUM CLEANING CABINETS

8—Cabinets, 8000 CFM with Buffalo Exhausters, 7½ H.P., 220/440/3/60.

TUMBLING MILL

1—Sly Model 00 tilting type barrel with shot return.

EUCLID FOUNDRY & MACHINE EQUIPMENT COMPANY

14919 SARANAC ROAD TELEPHONE: GLENVILLE 1-1222 CLEVELAND 10, OHIO

FOR SALE

AIR COMPRESSORS

Ingersoll Rand Type 10—14 x 9 x 12, 2 stage, 75 HP, 3/60/220/1200 rpm synchronous motor, 350 CFM at 100#.

5 x 5 Ingersoll Rand 10 HP motor.

Ingersoll Rand Type 10, 800 CFM, XRB2, 16" stroke 20" x 12½" cylinder, 2 stage compressor, 206 HP, 220 volt motor, with starter and air receiver. Complete. This unit was rebuilt in 1952 by Earl Knox Co.

Ingersoll Rand Type 10, 800 CFM, 2 stage air compressor, 200 HP, 220 V motor. This is an older unit. No starter or air receiver. Overhauled in 1951.

Sullivan Vertical Single Stage 100 HP air compressor, 220 volt motor, with starter and air receiver.

BLOWERS

Spencer Turbo Blower, 2250 CFM at 16 oz. 15 HP 3/60/220 totally enclosed motor. New 1947.

Ingersoll Rand Motor Blower Type FS. Single Stage 4000 CFM @ 3.75 PSI, 100 HP, 220 V. G.E. Induction Motor.

Buffalo 7E Direct Connected Blower, 50 HP Westinghouse motor, 3/60/220-440 V. 3535 rpm, 28" wheel, 3500-4000 CFM at 32 oz. Flanged outlet.

General Electric 7500 CFM, 20 oz., 89.6 Max HP, 220 V motor, Airway controls.

CLEANING EQUIPMENT

Sly 8' Dia. Table Shot Blast Unit.

CONVERTER

160 KW Rotary Westinghouse 220 V 60 cycle primary 250 V DC, complete with controller and panel.

CORE BLOWERS

International SB 13.
Federal Sandblo CB40B, like new.
Demmler #50.
Peterson Core Blower (Similar to Demmler #50).

CRANES

10 Ton Shaw Box Floor controlled 20' span, hand travel bridge.

CRUSHERS—PULVERIZERS

1—Stedman 15" x 12" Type A. With 10 HP 220-440 V motor.

DUST COLLECTORS

Whiting Dust Suppressor, bag type, 12,000 CFM, 30 HP motor to handle hot fumes from electric furnace hood. New 1953. Cost us over $14,000 before erection and without wiring or duct work.

Rotoclone 16 W arrangement C Dynamic Precipitator, Wet type chain, sludge ejector, 30 hp motor.

GRINDERS, DISC

Besley 20S Double End 26" x 2⅜" wheel with 2 compound tables, V belt drive. 15 HP, 220-440 totally enclosed motor magnetic starter controls.

2—U. S. Model 80 Double End 2-18" dia. wheels, 7½ HP motor, 2 swinging tables 8" x 14"—1 with hand lever feed.

GRINDERS, SNAGGING

McCabe 2" x 24" wheels, 48" between wheels, 3/60/440 V.

1—Hammond type 20 WR2—3" x 24" wheel, double end grinder, single speed, 20 HP Louis Allis Squirrel Cage, 220-440 V—1760 rpm motor.

1—U. S. DE, Model 65, 3" x 24" wheels, variable speed, 20 HP motor.

Kling Bros. 30" Double End Snag Grinder, heavy duty, 15 HP motor.

Kling Bros. 18" Double End Snag Grinder, heavy duty.

GRINDERS, SWING

2—Fox 10 HP 3/60/220-440 V. Swing Frame.
U. S. 15 HP, 3/60/440 V Swing Frame, 2 speed.
Fox 15 HP Swing Frame, 2 speed.
Marschke 20 HP, 2 speed.

HOISTS

1000# Cleveland 220/440 V.
1000# Detroit 220/440 V.
5—1000# P & H Hevi Duty with trolley.
11—4000# P & H Hevi Duty with trolley.
2—4000# P & H Hevi Duty with trolley and powered drive unit for moving hot metal.

LADLES

1 Ton Enclosed Gear Crane Ladle truck type 4 wheel car for 18" gage track. Whiting Junior.

LADLES, GEARED CRANE

1 Ton Enclosed Gear Crane Ladle, truck type, 4 wheel car, for 18" gage track, Whiting Junior.
1—42" x 47" Crane Ladle.
2—44" x 44" Crane Ladles.
Modern Cylindrical geared ladle 28" x 26".
Modern 34" x 34"—5000# lip pour.
Modern 50" x 50"—Inside Teapot Spout.
Modern 40" x 40"—Lip pour.
Whiting 1 ton—with truck, 4 wheel, 18" gauge.

MOLDING MACHINES

1—Johnston & Jennings 1015 Jolt Pin Lift, 30" x 38" table.
1—Champion Hand ram, hand clamp, hand rollover 26" x 14" table.
1—Champion Hand Ram, Hand rollover, Hand draw core machines, 15 x 15 bed.
2—Champion Pin Push Offs, 10" draw, 28" x 42" table.
3—Davenport Portable Jolt Rollover Pattern Draw 20" x 24" tables, open end, 8" draw.
1—International Type G 24 x 10 Jolt Rollover foot draw, 22" x 30" table, 10" draw.
1—Herman Molding Machine Jolt Rollover Pattern Draw, 20 x 30.
1—Herman Molding Machine Jolt Rollover Pattern Draw, 20 x 36.
1—International Type G 30 x 12 Jolt Rollover Foot Draw, 28" x 36" table, 12" draw.
1—International Type G 30" x 30" table, 9" draw, Portable.
2—International Type G 18" x 56" table, 8" draw. Portable.
1—International Type F Jolt Rollover 27 x 12, 12" draw, 35" x 26" table.
1—International Jolt Rollover Pattern 10" Draw, 22" x 30" plate, 6" jolt cylinder.
1—International Plain Jolt Molding Machine 48" x 60" table, no pit required.
1—Herman Jolt Rollover Pattern draw, 40" x 84" table, slotted nickel alloy table over regular table to accommodate various sized flasks, air clamp, new 1946. Used very little.
1—Herman 20" x 30" rollover pattern draw, 750# series. Air clamp.
2—Herman 20" x 24" Jolt Rollover Pattern Draw, 750# series. Air clamp.
1—Herman 4000# Series High Speed Rollover 30" x 60" with 32" x 48" bumper, 13" cylinder pattern device.
2—Milwaukee Arm Type Jolt Squeeze Strippers, 1500# capacity, Model 163-50 Serial 13104-5, 15" x 24" table, 16" x open end, pattern size. Late type.
1—Osborn 76J Portable Jolt Squeeze Molding Machine 12" cylinder.
1—Osborn 405 Jolt Rollover 40" x 70", 2000# capacity, 20" x 60" jolt table and 4 wheel receiving car.
1—Tabor 1000# Rollover, 30" x 60" table.
2—Spo 214 Jolt Squeeze Pin Lifts.

MULLERS AND MIXERS

Simpson #3 Motor on base.
Simpson #3 Type H open gear type.
Simpson #3 Open Gear Type $1000.00.
Simpson #3 Muller with bucket loader.
American Model M Sand Cutter 70" blades.
Royer NDP 47 14" Belt, 4 rubber tires.
B & P Speedmuller 80 w/cooling blower.

PREPARATOR

B & P #70 Preparator. Only used 3 months.

RIDDLES

Champion Sand Riddle, floor type.
Universal Sand Riddle.

ROTOBLAST

Pangborn, table with 3-8" rotating work tables, 3 position loading, cleaning and touch-up designed for work similar in size to aircraft cylinders. Like New condition.

SAND HANDLING EQUIPMENT

Blaw Knox Sand Grab Bucket for crane use.

SAND SLINGER

B & P Stationary, 19" head w/bucket elevator feeder.

SAWS

Crescent Band Saw, 30" cap., w/3 HP 220-440 V motor.

SHAKEOUTS

1—4' x 6' Simplicity, 15,000# capacity.

SPEED REDUCERS

We have a large stock of speed reducers and geared head motors. Write us your needs.

WIRE STRAIGHTENERS

Climax #3 Core, Rod Straightener, ¼" to ⅜" cap. with 2 HP motor.

Climax #2 Core, Rod Straightener, ⅛" to ¼" cap. with 1 HP motor.

FLASKS

Hines Popoff and Jackets
1st Figure is Depth of Cope
2nd Depth of Drag

2—10" x 17" flask 4/3
1—10" x 18" flask 5/4
1—11" x 16" flask 5/4 1/2
1—11" x 22" flask 5/4
1—12" x 12" flask 5/3 1/2
1—12" x 16" flask 5/7
2—12" x 16" flasks 6/5
1—12" x 16" flask 7/5
1—12" x 16" flask 7/7
1—12" x 16" Extra 4½" drag
13—12" x 16" C.I. Jackets
1—12" x 18" flask 5/4
2—12" x 18" flasks 6/6
1—12" x 18" flask 7/7
1—12" x 18" extra drag 5"
1—12" x 18" extra drag 7"
11—12" x 18" C.I. Jackets
1—12" x 20" flask 5/5
1—12" x 20" flask 5/7
1—12" x 20" flask 7/5
1—12" x 20" extra 5" drag
2—12" x 20" C.I. Jackets
2—12" x 22" flasks 5/5
8—12" x 22" C.I. Jackets
1—12" x 30" flask 5/5
11—12" x 30" C.I. Jackets
1—14" x 28" flask 6/6
1—15" x 18" flask 5/3 1/2
1—16" x 21" flask 6/5
1—17" x 17" flask 6/5
1—19" x 19" flask 5/4
1—20" x 20" flask 6/6
2—24" x 24" flask 8/8
1—24" x 24" 3" drag upset
1—24" x 24" extra 6" cope upset
3—24" x 24" C.I. Jackets
1—24 x 28" flask 6/6 1/2
2—34" x 34" flasks
10—34" x 34" C.I. Jackets

ACME EQUIPMENT CO., INC.

WE WILL BUY FOR CASH A SINGLE PIECE OF EQUIPMENT OR YOUR ENTIRE FOUNDRY

126 South Clinton Street Phone: Andover 3-3430 Chicago 6, Illinois

INSPECT AT OUR EXPENSE!

Your travel expenses refunded if any machine in our warehouse is not as represented. Why don't you join the hundreds of foundries that are lowering costs and raising production with late type . . .

UNCONDITIONALLY GUARANTEED EQUIPMENT REBUILT BY UNIVERSAL

AIR COMPRESSORS

1—40 HP SULLIVAN, Model B-Bim #8, WL 60 w/Receiver.

BLOWERS

1—85 HP G.E. Cupola Blower, 24 oz.
1—40 HP SPENCER, 3600 CFM, 24 oz.
3—7½ HP FISHER, 16 oz.
15—CENTRIFUGAL BLOWERS, 350 CFM to 10,500 CFM.

CLEANING EQUIPMENT

1—AMERICAN #1 MULTITABLE, 6 aux. tables 15", main table 45".
1—ROBBINS SHAKEOUT, 4' x 2'.
1—AMERICAN #2 MULTITABLE, 5 tables, 37" dia.
1—PARSONS Sand Blast Room, 7' x 7' x 12'.
2—SIMPLICITY SHAKEOUTS, 4' x 6'.
1—LINK BELT SHAKEOUT, 5' x 8', 5 HP Motor.
5—US GRINDERS, double end, 10, 15, 20 HP.
4—GRINDERS, Swing frame, 15 HP.
2—TUMBLING BARRELS, Cast Iron, 36" x 24" w/2 HP Motor.
2—TUMBLING BARRELS, Square, 34" x 48".
2—TUMBLING BARRELS, Side Tilt, 18" wide x 20" deep.
3—TABOR CUT-OFF Saws, 5 & 10 HP.

CONVEYORS

1—HEWITT-ROBINS, Shaker Type, vibrating, 100' long.
1—JEFFREY, 28' long, 20" belt, troughing idlers.
1—LINK-BELT, 50' long, 19" rubber belt, w/drive.
1—APRON FEED, 10'7" centers, w/drive.
1—STEEL PLATE MOLD, 90' centers, 30" belt, w/drive.
2—STEEL PLATE MOLD, 90' centers, 24" belt, w/drive.
6—SAND BELT CONVEYORS, 10' centers to 140' centers, 18" to 36" belt, complete w/drives and hoppers.
2—CASTING CONVEYORS, wire mesh, 18" x 32" w/drive.
FOUNDRY TYPE ROLLER CONVEYOR—ALL SIZES—SEND REQUIREMENTS

CUPOLAS

1—WHITING, #4, with skip charger motor and blower.
1—WHITING #6, Complete.
1—WHITING #7.
1—MORRIS #9, w-skip, mixing ladle, never used.
2—WHITING, #8, EXCELLENT CONDITION, COMPLETE.
1—MODERN, #3, 46' shell, w/blower.
1—SKIP CHARGER, 3 bottom drop buckets, blower, motor, and scale for #9 Cupola.

CORE BLOWERS

1—CB-400 CHAMPION. 1—3K DEMMLER.
1—#55 DEMMLER. 1—#92 OSBORN.
1—FEDERAL, San-Blo.
1—SB 13 INTL.

DUST COLLECTING

1—SLY, 83" wide x 43" deep x 113" high, 4' hopper, 13" inlet, bag type.

FLASKS & CORE PLATES

400 TONS, CAST STEEL, STRUCTURAL STEEL and STERLING TYPE FLOOR FLASKS—ALL SIZES.
20 TONS, FLAT STEEL and PERFORATED STEEL CORE PLATES.
SEND FOR COMPLETE LISTINGS.

FURNACES—DIRECT ARC MELTING

1—150#/hr. "LECTROMELT".
1—250#/hr. Hydraulic Top Charge.
1—500#/hr. "LECTROMELT".
1—1000#/hr. HEROULT.
1—1 Ton WHITING Top charge.
1—2 Ton SWINDELL, Top charge.
1—1000# SWINDELL.
1—2 Ton WHITING top charge.
2—3000# HEROULTS.
1—2 Ton HEROULT.
1—6 Ton HEROULT.
Several 3 Ton to 10 Ton capacity Side and Top Charge Furnaces.

FURNACES—DETROIT "ROCKING"

2—200# cap. DETROIT, complete.
3—350# cap. DETROIT, complete.
1—1000# cap. DETROIT, complete.
1—3000# cap. DETROIT, less transformer.
1—1500# DETROIT, Complete.
1—60# DETROIT, Complete.

FURNACES—INDUCTION MELTING

1—20 KW AJAX Spark Gap High Frequency, 17 lb. capacity in steel.
1—25 KW AJAX HIGH FREQUENCY M. G. SET with CONTROLS, 50# CAP.
2—60 KW, AJAX-TAMA-WYATT, Alum.
1—80 KW, GE, 9600 Cy., MG Set.
3—333 KW, AJAX-TAMA-WYATT, 1500# Alum.
1—175 KW, 960 CY., MG Set, 1000# Cruc.
1—166 KW, AJAX, 60 Cy., Alum.

FURNACES—OIL AND GAS

1—HAUSFELD Tilting #675, 250 cruc. Oil.
1—FISHER 4 Burner MNP, 1700#, gas.
3—WALKER YORK #400 cruc. tilting, coke fired.
1—HAUSFELD Tilting, 1200# Mag.
3—MONARCH Oil Fired Stat., #60 cruc.
5—FISHER 400# Tilting, Oil fired.
1—SKLENAR, 2000#, Oil Fired.

LADLES & POURING DEVICES

2—6 TON TEAPOT, Worm Geared.
1—10 TON WHITING, Lip and Bottom Pour, EZ mechanism, used once.
4—10 TON BOTTOM POUR, 55" x 55".
2—15 TON BOTTOM POUR, 65" x 59".
2—45 TON TREADWELL, Excellent.
1—20 Ton lip Pour, 72" x 72".
1—SWINDELL, Elec. Holding.

MOLDING MACHINES

5—MILWAUKEE Jolt Pin Lift 32" x 38".
2—MILWAUKEE Jolt Squeeze Strippers, #163.
1—J & J #612 Port. Rollover, 24" x 30".
1—J & J #815-B Rollover.
3—INTERNATIONAL "G", 24" x 10" Jolt Rollovers.
5—OSBORN Jolt Rollovers, Hand Draw, #142.
3—OSBORN 710J Jolt Squeeze Strippers, 16" x 25" table.
1—OSBORN 276PJ JOLT SQUEEZER.
3—TABOR Jolt Squeeze in Head.
1—OSBORN #243 Jolt Rollover.
1—OSBORN #559 Jolt Stripper, 25" x 30".
1—DAVENPORT 28SA, 28" x 40".
3—HERMAN Rollover & Jar, 6000#, 60" x 50".
2—HERMAN JOLT ROLLOVERS, 3000#.
11—DAVENPORT #30-T Jolt Strippers.
2—OSBORN #405 Jolt Rollovers.
2—TABOR POWER ROLLOVERS, #2242 w/clamps, late.
1—TABOR Jolt Stripper, 20" x 20", 4" draw.
2—TABOR ROLLOVERS, 30" x 40".
1—SPO, 9336, Jolt Clamp rollover draw.

MULLERS AND MIXERS

1—B & P MULBARO #3½.
2—SIMPSON #2, Unit Drive.
2—SIMPSON #3, Enclosed Gears.
2—CLEARFIELD #610 and #920.
1—BEARDSLEY & PIPER #60 SPEEDMULLER, 60 HP motor, SKIP-LOADER.
1—B & P Speedmuller, #40.
1—B & P Speedmuller, #70. 1953.

OVENS

2—FOUNDRY EQUIPMENT, 2 compartment 5' wide x 6' high x 10' deep, Oil Fired, Recirculating, Walk-in.
1—FOUNDRY EQUIPMENT, Oil Fired, 4 drawers.
2—ROSS 2 comp., rack, gas, 6½" x 14" x 7".
1—CRAWFORD, Gas Fired, 3 drawers.
1—HOTPOINT EDISON, ELECTRIC, 6 drawers, 30" x 40" x 8".
1—CORE OVEN, 82" high x 6' deep x 12' wide, 2 sets of drawers, gas or oil.
1—YOUNG BROS. 3 compartment, kiln type baking oven, electrically heated, with CONTROLS.

SAND CUTTERS

5—AMERICAN SAND CUTTERS—
1—MODEL "AA", 60" reel, Gas Driven.
1—MODEL "K", 72" reel, Gas Driven.
1—MODEL "F", 80" reel, Gas Driven.
1—MODEL "D", 76" x 96".
1—SANDMASTER, 70/102, New in 1950, Rubber Tires.

SAND LABORATORY EQUIPMENT

1—TEST CORE BAKING OVEN #606.
1—MOISTURE TELLER #278T.

SAND PREPARATORS

1—REDDY SAND UNIT.
2—JEFFREY SANDITIONERS, Portable.
5—SCREENERATORS, Size "S" and "M".
3—ROYER SAND BLENDERS, 16" belt, 12" belt, 8" belt.
1—LINK BELT REVIVIFIER, Size 5.
2—B & P SAND CONDITIONERS, portable.
1—LOWE GYRATORY RIDDLE.
1—HETHERINGTON & BERNER SAND DRYER, rotary, oil fired, #552.

SAND SLINGERS

1—BEARDSLEY & PIPER MOTIVE JR. 19" head.
1—BEARDSLEY & PIPER TRACTOR TYPE 16" head, magnetic separator.
1—PORTABLE SLINGER, 16" head, 4' long, on Truck.

TESTING MACHINES

1—TINIUS OLSEN, UNIVERSAL, 100,000# capacity.
1—TINIUS OLSEN, BRINELL HARDNESS, 3,000 KG.
1—RIEHLE, UNIVERSAL, 2 screw mechanical, 100,000# capacity.
1—RIEHLE, BRINELL HARDNESS, hydraulic, 3,000 KG.
1—ROCKWELL HARDNESS, #5JR with "C" Brail.
1—BALDWIN - TATE - EMERY, UNIVERSAL, Hydraulic tensile, 24,000#.

TRUCKS

2—CLARK, FORK LIFT, 108" lift, Gas.
2—HOUGH PAYLOADERS, Model HA, Hydraulic Trip.

IN ADDITION: We are now liquidating several large foundries. Send your requirements today. We'll fill them!

UNIVERSAL MACHINERY AND EQUIPMENT CO.

TELEPHONE READING 7-1321

320 East Broad Street
Shillington, Reading, Pa.

America's Largest Stock of Electric Melting Furnaces!

1—1500 KVA G. E. Transformer with taps for 11,000 or 13,800 volts.

Lectromelt 1 ton Side Charge with 800 KVA, 12,000 V transformer. Late type unit. Complete. Now in our Chicago warehouse.

1—Whiting Hydro Arc 8 MT Top Charge, 5600# per hour rate of melt, 8900# capacity of well, 8" electrodes. Furnace new 1952. 2000 KVA transformer, 12,000 volts. Complete with American Air Filter, smoke hood and Whiting Bag Type Dust and Smoke Suppressor. May be seen in place Chicago.

1—Chicago 3000# Electric Furnace, tilt back head. 4" electrodes, 800 KVA, 12,000 V transformer. Complete. May be seen in place Chicago.

1—Swindell Type 6 ton 9' diameter Shell Electric Furnace, 2500 KVA transformer, 13,800 or 11,000 V. In our Chicago warehouse.

Lectromelt 500# Side Charge Type T, 300-375 KVA transformer, 2300 V primary, Moore controls, G. E. circuit breaker. Late type. Now in our Chicago warehouse.

Transformers—2—2500 KVA furnace transformers, 11,000 or 13,800 primary voltage.

1—Detroit Electric, 1500# capacity, 13,200 primary voltage. Kuhlman transformers. Complete with controls.

Detroit Electric 350#, Type LFA with Kuhlman transformers and oil circuit breaker, 13,200 primary voltage.

Detroit Electric with 350# and 1000# tapered shells, 2300 V Kuhlman Transformer. Complete with panelboard and bus bars.

Herrault 2000# Side Charge, complete with Pennsylvania 1500 KVA transformer, 12,000 volt primary and 150-90 volt secondary. New control panel; new Field Rheostat, new motor generator set-ball bearing, 25 HP, 3/60/440 V/1800 rpm, 250 V compound wound. With 51 nipples and sufficient roof brick for almost six roofs.

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Switch Screens in 5 Seconds!

NO "TIME-OUT" FOR CHANGES

WORLD FAMOUS!

Type "HL" Lab Sifter for sand control $225.00 without sieves.

Type "CS" with 24" square screen and automatic discharge $320.00

Type "CR" with 24" sieve $310.00

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With 20" sieve . . . $250.00
Also made with 36" sieve $450.00

All these machines cost less than 1c an hour for power. Quickly removable steel rim sieves can be removed, emptied and replaced in seconds. Saves up to 97% of your labor costs. Send for free descriptive folder.

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GREAT WESTERN MFG. CO.
LEAVENWORTH • KANSAS

Step ahead in this five billion dollar market with

Foundry's PLUS 5 SERVICE

What is PLUS 5? It's your key to more business from foundries. It gives every FOUNDRY advertiser a bonus he can get from no other source. Here is help in analyzing this market—studying sales territories and potentials—planning the sales effort—and creating a constructive promotion program to the 5 billion dollar foundry market. It's time to take a new look at this market—and at the unusual selling aids we have for you. Say PLUS 5 to your FOUNDRY representative and he'll show you this 5-step program designed to move more of your products into foundries.

A Penton Publication

FOUNDRY

more than a magazine . . . a complete sales development service

Penton Building, Cleveland 13, Ohio

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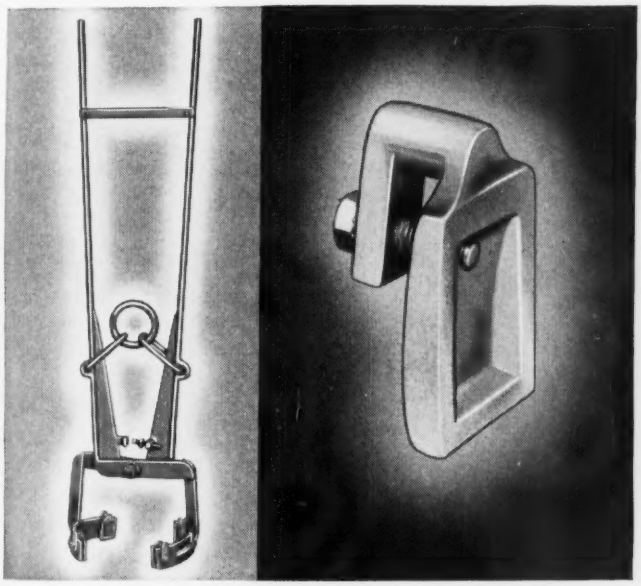
NEW *Efficiency . . .* **NEW** *Safety*
for your foundry with

INDUSTRIAL CRUCIBLE TONGS

with self-adjusting contact pads



Foundries that have already switched to Industrial's new tongs with the self-adjusting pad tell us that since pourers no longer need worry about crucibles crushing or slipping, or their own safety, efficiency has greatly improved.

Efficiency will improve in your plant too. One of the oldest hazards of foundry operation has been eliminated by Industrial's application of the new self-adjusting pad to their dependable tong. The pads are provided at the four contact points for maximum strength, yet they are still flexible and adjust themselves automatically to surface irregularities of all sizes and makes of crucibles.

Crucible life is lengthened, the full pad makes contact, a simplified screw and locknut adjustment fits tongs to crucible just below the bilge. Specify Industrial's new tongs for new safety and efficiency in your foundry.

Available on 7 different styles of tongs. Write factory for bulletin 11-A.

Foundry Division

Industrial
EQUIPMENT COMPANY

115 N. Ohio Street, Minster, Ohio

FROM IDEA . . .

TO FINISHED INSTALLATION

ENGINEERED FOR YOUR SPECIFIC REQUIREMENTS

Most of America's leading manufacturers are well aware of the many advantages of automation. The question is no longer "Should we automate?"—competitive market conditions have answered that! The problem now becomes, "To what *extent* is it practical and profitable to automate – and how far should we go *now*?

The Service Conveyor Company can help you determine the solution to this problem—a solution that will meet all your operating and cost requirements. Drawing upon its twenty-five years of experience in the field of practical automation, Service can plan, design, engineer, build and install the *right* automated facilities and equipment for your plant!

Service—engineered automation does not mean installing *all* new equipment. Service utilizes your existing facilities – supplementing them with the additional equipment required—to achieve continuous, integrated production flow. Discuss your automation plans in complete confidence with a Service engineer. Write for full details today!

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Engineered Automation—Ideas, Methods and Experience

NONFERROUS TOO!

Two, Model "F" pouring devices pouring aluminum floor treads and corner protectors for Wooster Products Inc., Wooster, Ohio.

ONE-MAN POURING, This Easy Way—

MODERNIZED pouring, directly into the nonferrous molds from graphite crucibles, saves backs and bucks too! It's a safe, winning combination "straight-thru" from monorail track to crucible spout:

- Trolleys are designed for the safe, fast movement of molten metal . . .
- Anti-friction-bearing, swiveling hook-eye permits smooth, easy turning for right and left spotting . . .
- Steel, cut-tooth machined rack is rigidly supported by machine-turned rollers in the side arms. No sway! No spill!
- Bail with quick-detachable hooks safely grip the trunnions . . .
- Tilting action is transmitted from hand-shank through machined-ring which fits contour of the crucible. Raised trunnions lend proper support and balance . . .

MODERN — the original pouring device affords rigid, straight-line, positive control from monorail to crucible spout.

FOR OTHER FACTS AND COST FIGURES ASK FOR CATALOG P-152:

50 PAGES OF POURING FACTS

Catalog P-152 illustrates construction features and production facts on MODERN pouring devices, crucibles, ladles, cranes and monorail systems. Eighteen types of ladles, as grouped by series numbers, diameters and metal capacities, match-up metal loads with gross lifting capacities.

MODERN

NEW Catalog P-152 mailed on request

MODERN EQUIPMENT CO. Dept. F-5, Port Washington, Wis.
Mail to my attention, new catalog P-152
Also send information on mechanical charging ☐ dust collection control ☐ cupolas ☐

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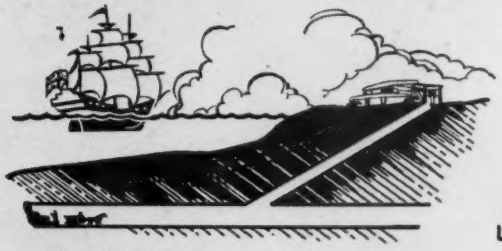
"Facing" Facts

FROM STEVENS FACING DEPARTMENT

SEACOAL WAS FIRST DISCOVERED IN ENGLAND, NEAR NORTHUMBERLAND, WHERE THE SEA HAD DENUDED THE SHORE. IT WAS GATHERED BY WOMEN AND CHILDREN AND SOLD FOR FUEL.



WHEN THE TUNNELS OF MINES IN WALES WERE FOUND TO EXTEND UNDER THE SEA THE NAME SEACOAL BECAME MORE COMMONLY USED. WHEN BROUGHT TO AMERICA BY BOAT THE TERM "SEACOAL" WAS FIRMLY ESTABLISHED.

A FAR CRY FROM MANY OF TODAY'S MODERN DUST-FREE FOUNDRIES, COALBROOKDALE FOUNDRY, IN SHROPSHIRE, ENGLAND, CAST THE FIRST IRON CYLINDERS FOR STEAM ENGINES ABOUT 1740, USING SEACOAL IN THE MOLDING SAND.

STEVENS DUSTLESS KLEEN-AIR SEACOAL MIXED WITH MOLDING SAND MAKES CLEAN CASTINGS AND A CLEAN FOUNDRY. THE VOLATILE MATTER, LIBERATED WHEN HOT METAL ENTERS THE MOLD, FORMS A GAS CUSHION BETWEEN SAND AND METAL, AIDING PEEL OF SAND FROM CASTINGS.

TRY THIS TEST! FILL A GLASS JAR ⅓ FULL WITH STEVENS DUSTLESS SEACOAL. PUT ORDINARY SEACOAL IN A SECOND JAR. COVER THE JARS AND SHAKE VIGOROUSLY. REMOVE COVERS AND NOTE DIFFERENCE IN THE DUST CLOUD. STEVENS DUSTLESS KLEEN-AIR SEACOAL SHOWS ABSENCE OF DUST CLOUD.

IMPROVE FOUNDRY WORKING CONDITIONS

USE STEVENS DUSTLESS KLEEN-AIR SEACOAL AND KING KORE KOMPOUND

Better working and health conditions are big goals of the Foundry Industry today. When you use Stevens Dustless Kleen-Air Seacoal or King Kore Kompound, you not only greatly improve working conditions, but you gain the high quality casting results so widely recognized when these Stevens products are mixed with molding sand.

Stevens Kleen-Air Seacoal and Pitch Core Compound offer foundries many advantages: No dust floats in the air around workers . . . Less is lost since all of the powder goes into the mulled sand mix . . . There is less loss in sand reclamation systems . . . Handling and storage of the bags are cleaner . . . Casting finish is improved.

More and more foundries are using Stevens Kleen-Air Dustless Seacoal and King Kore Kompound. If you are interested in additional data on these and other products that contribute to cleaner foundry operations write for Technical Bulletin F-126, "Quick Steps to Cleanliness in the Foundry." Frederic B. Stevens, Inc., Detroit 16, Michigan.

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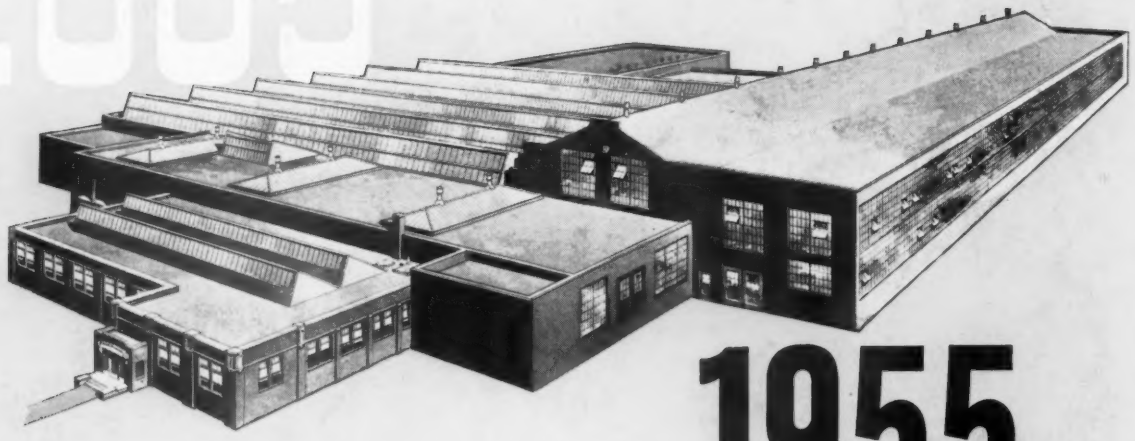

1955

our 70TH Anniversary year

● Nearly three-quarters of a century! In foundries especially there have been many changes. Simple elevators and conveyors have been replaced with completely automated systems that tie all departments together into a smooth running synchronized operation. Elapsed time from cupola spout to shipping dock has been reduced from weeks, sometimes to minutes.

We have been privileged to assist in the planning, and have built and installed major parts of the equipment for many of the country's most modern, best known and lowest cost foundries. Let us help you with your next modernization, plant extension or new plant project. Our long experience and complete facilities can really save you money!

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